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Vol. I

TRANSCRIPT OF RECORD

Supreme Court of the United States

OCTOBER TERM, 1930

No. 48

AMERICAN FRUIT GROWERS, INC., PETITIONER,

vs.

BROGDEX COMPANY

ON WRIT OF CERTIORARI TO THE UNITED STATES CIRCUIT COURT OF APPEALS FOR THE THIRD CIRCUIT

PETITION FOR CERTIORARI FILED FEBRUARY 15, 1930

CERTIORARI GRANTED MARCH 17, 1930

(34,798)

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SUPREME COURT OF THE UNITED STATES

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VOL. I

INDEX

	Original	Print
Record from district court of the United States, district of Delaware	1	1
Docket entries	1	1
Bill of complaint	5	3
Amended answer	10	6
Stipulation as to facts, etc	20	14
Opinion, Morris, J	21	16
Interlocutory decree	26	19
Assignments of error	28	21
Statement of evidence	30	22
Appearances of counsel	30	22
Plaintiff's opening statement	31	23

JUDD & DETWEILER (INC.), PRINTERS, WASHINGTON, D. C., JUNE 27, 1930

	Original	Print
Testimony of Reginald L. Knox	32	24
James Wolstencroft	54	42
Reginald L. Knox (recalled)	66	52
Fred C. Jacobs	68	54
Harry W. Pierce	72	57
Sidney O. Chase	76	60
Lee B. Skinner	82	65
Charles I. Cartwright	91	73
Roy L. Hendrix	100	80
John H. Ritchie	104	84
Christie P. Earley	107	86
Stafford W. Austin	112	90
William R. Millar	115	93
Jesse J. Parrish	121	98
Ernest M. Brogden	123	99
Bronson C. Skinner	130	105
Henry C. Fuller	138	111
Ernest M. Brogden (recalled)	142	114
Alfred B. Michael	144	116
Albert H. Morgan	170	137
Frank C. Bishop	218	177
Alfred R. Sandlin	226	183
Samuel L. Harris	236	191
Alfred L. Sandlin (recalled)	242	196
William T. Du Pree	243	197
Edward L. Markell	248	201
John R. Winston	264	215
Herbert C. Gore	280	227
William M. Scott	286	233
William R. Barger	291	236
Carl L. Alsberg	329	268
Lee B. Skinner (recalled)	378	308
Allan H. McIntyre	386	313
Bronson C. Skinner (recalled)	390	318
John F. Bauchelle	399	325
Colloquy between court and counsel	416	339
Testimony of Charles A. Meyer	420	342
Antone C. Barke	423	344
Walter A. Boone	426	347
Arthur R. McCorkle	434	354
William H. Clifton	449	366
Leland D. Niles	454	370
Gilbert T. Ballantyne	495	404
Charles R. Pilkington	500	408
Frank L. Skelly	508	415
George Wood	513	418
A. J. Davis	523	427
E. D. Howard	541	442
A. P. Kelley	549	448
George W. Palmer	555	453
Fred J. Burden	574	468

	Original	Print
Testimony of Walter A. Robinson	576	469
Kirby L. Chilton	580	473
Jonas Meeks	588	479
Gus Taylor	591	481
Gamaliel W. Holmes	602	490
H. H. Allen	607	495
Minos E. Miller	610	496
J. C. Thompson	619	504
Albert E. Barnes	627	511
Shadrach D. Manning	630	513
Notice re taking of testimony	646	526
Testimony of William S. Hart	648	528
Mrs. Laura Crews	676	550
Mrs. Carrie Tanner	679	553
Jeremiah B. Booth	682	556
William K. Turner	691	562
Stipulation re record	696	566
Order approving stipulation re record	696	566
Stipulated præcipe for transcript of record	697	567
Order approving stipulated præcipe	700	569
Clerk's certificate (omitted in printing)	701	
Proceedings in United States circuit court of appeals, third circuit	702	570
Order designating judge	702	570
Argument and submission (omitted in printing)	703	
Opinion, Davis, J	704	571
Decree	713	578
Petition for rehearing	714	579
Order denying rehearing	723	583
Clerk's certificate (omitted in printing)	724	
Plaintiff's Exhibit 1—Brogden and Trowbridge U. S. patent No. 1,529,461 March 10, 1925, in suit	1	585
2—Bulletin No. 139, University of California, February, 1902, "Orange and Lemon Rot," by C. W. Woodworth	11	604
3—Florida Agriculturalist, September 28, 1904, "How to Prevent Decay of Our Citrus Fruits"	23	616
4—"Citrus Fruits and Their Culture," by H. Harold Hume (1904), pp. 477-479	31	620
5—California Cultivator, April 14, 1905, "Causes of Citrus Fruit Decay," by G. Howard Powell	35	623
6—"The Handling of Fruit for Transportation," by G. Harold Powell, reprint from Year Book of Department of Agriculture, 1905	47	632
7—Proceedings of twentieth annual meeting of Florida State Horticultural Society, May, 1907, "The Influence		

	Original	Print
of Packing Methods on the Carrying Qualities of Citrus Fruits," by L. S. Tenny	67	649
Plaintiffs Exhibit 8—Bulletin No. 123, U. S. Department of Agriculture, "The Decay of Oranges While in Transit from California," March 31, 1908, by G. Harold Powell	83	693
9—Proceedings of twenty-first annual meeting of Florida State Horticultural Society, May, 1908, "Methods of Shipping and Packing," by W. S. Hart	171	755
10—Circular No. 19, U. S. Department of Agriculture, "The Decay of Florida Oranges While in Transit and on the Market," by L. S. Tenny	183	766
11—American Review of Reviews, 1909, "Improved Methods of Fruit-Handling," by F. J. Dyer	191	777
12—Circular No. 26, U. S. Department of Agriculture, "Some Factors Affecting the Keeping Qualities of American Lemons," by R. H. True	199	788
13—Proceedings of twenty-second annual meeting of Florida State Horticultural Society, May, 1909, "Packing and Shipping Citrus Fruits," by L. S. Tenny	219	808
14—Proceedings of twenty-third annual meeting of Florida State Horticultural Society, May, 1910, "Causes of Decay of Florida Oranges in Transit to Market," by A. V. Stubenrauch	251	835
15—Proceedings of twenty-fourth annual meeting of Florida State Horticultural Society, May, 1911, "Stem-end Rot and Gummosis," by H. S. Fawcett	283	864
16—Circular, Citrus Protective League, February 4, 1911, "The Decay in Citrus Fruits While in Transit," by G. Harold Powell	301	880
17—Circular No. 2, Citrus Protective League, February 18, 1911, "The Prevention of Decay in Citrus Fruits," by G. Harold Powell	305	883
18—Bulletin U. S. Department of Agriculture, July 13, 1911, "The Relation of Handling to Decay in California Navel Oranges; Season of 1910-11," by A. V. Stubenrauch	310	888

	Original	Print
Plaintiff's Exhibit 19—Bulletin No. 108, University of Florida, November, 1911, "Diseases of Citrus Fruits," by Rolfs, Fawcett and Floyd	321	897
20—Proceedings of twenty-fifth annual meeting of Florida State Horticultural Society, May, 1912, "The Relation of Handling to Decay of Florida Oranges in Transit and on the Market," by H. J. Ramsey	325	902
21—"The Handling and Precooling of Fruits for Transportation," by A. V. Stubenrauch, 1912	348	922
22—Letter, Fruit, November, 1912, pages 59-65, "Fruit Handling and Precooling Investigations," by A. V. Stubenrauch	353	926
23—Proceedings of twenty-sixth annual meeting of Florida State Horticultural Society, May, 1913, "Citrus Fruit Handling and Storage," by A. W. McKay	363	936
24—Bulletin No. 63, U. S. Department of Agriculture, March 28, 1914, "Factors Governing the Successful Shipment of Oranges from Florida," by A. V. Stubenrauch	399	967
25—Bulletin No. 7, Board of Commissioners of Agriculture, Porto Rico "The Handling of Porto Rican Oranges, Grapefruit, and Pineapples," by C. W. Mann	465	1051
26—Proceedings of twenty-seventh annual meeting of Florida State Horticultural Society, April-May, 1914, "Packing and Shipping Citrus Fruits," by S. F. Poole	468	1054
27—Agricultural Gazette of New South Wales, Vol. XXV, November 2, 1914, "Fungus and Other Diseases of Citrus Trees"	492	1075
28—The Florida Grower, Vol. X, No. 8, May 23, 1914, pp. 10-11	497	1079
29—Porto Rico Progress, Vol. VIII, No. 1, December 23, 1914, pp. 5-7, "The Rot of Citrus Fruit"	501	1080
30—Proceedings of the twenty-eighth annual meeting of Florida State Horticultural Society, April, 1915	506	1084

		Original	Print
Plaintiff's Exhibit 31	—Circular, U. S. Department of Agriculture, 1915, "The Relation of Washing to Decay in Washington Navel Oranges," season 1914-15"...	517	1093
32	—Bulletin No. 696, U. S. Department of Agriculture, November 10, 1915, "Handling and Shipping Citrus Fruits in the Gulf States," by H. J. Ramsey.....	525	1097
33	—"Citrus Fruits," 1915, by J. Eliot Coit	553	1132
34	—Proceedings of forty-eighth California State Fruit Growers' Convention, "The Causes of Unnecessary Decay in Lemons," by R. L. Willits.....	557	1136
35	—Standard Cyclopedia of Horticulture, by L. H. Bailey, pp. 3367-71.....	567	1145
36	—Quarterly Bulletin of the State Plant Board of Florida, October, 1917....	585	1161
37	—Quarterly Bulletin of the State Plant Board of Florida, July, 1918.....	588	1164
38	—The California Citrograph, July, 1920	610	1181
39	—Monthly Bulletin of Department of Agriculture, California, September, 1920, "Decay in Citrus Fruits During Transportation," by O. F. Burger	613	1186
40	—The California Citrograph, March, 1921, "Need of Care to Prevent Blue Mold Decay in Transit," by H. J. Ramsey	622	1195
41	—Circular No. 293, U. S. Department of Agriculture, October, 1923, "Commercial Control of Citrus Stem-end Rot"	629	1200
42	—Leaflet No. 114, Western Australia Department of Agriculture, 1923, "The Occurrence of Blue Mold on Citrus Fruits," by W. M. Carne....	639	1215
43	—"American Fruits," 1924, by Samuel Fraser, pp. 190, 191, 275, 632, 633..	645a	1219
44	—Leaflet, U. S. Journal of Agricultural Research, May 31, 1924, "Preliminary Results With the Borax Treatment of Citrus Fruits for the Prevention of Blue Mold Rot".....	649	1225
45	—The Florida Grower, November 1, 1924, "Controlling Blue Mold Rot of Citrus Fruits with Borax Solution," by Fulton and Winston.....	657	1230

	Original	Print
Plaintiff's Exhibit 46—Bulletins of Florida Citrus Exchange to subexchanges and association managers	659	1241
47—The Citrus Industry, February, 1925, "Preliminary Report of the Effect of Hot Water, Hot and Cold Borax Solution on Scale Insects," by W. W. Yothers	670	1250
48—The California Citrograph, March, 1925, "Treating Oranges with Borax Solution for Control of Blue and Green Mold," by W. R. Barger	671a	1251
49—Proceedings of thirty-eighth annual meeting of Florida State Horticultural Society, April, 1925, "The Borax Treatment of Citrus Fruit for Prevention of Decay," by H. R. Fulton	673	1256
50—Journal of Agricultural Research, Vol. XXX, No. 2, January 15, 1925, "Borax as a Disinfectant for Citrus Fruits," by Barger and Hawkins	685	1263
51—The Florida Grower, October 10, 1925, "Borax as a Preventive of Decay," by J. W. Andrews	691	1275
52—"The Cultivation of Citrus Fruits," 1926, by H. Harold Hume, pp. 483-484	699	1281
53—Fulton & Bowman U. S. patent No. 1,557,757, October 20, 1925	703	1284
54—Fulton & Bowman U. S. patent No. 1,557,758, October 20, 1925	705	1288
55—Barger, Hukill & Hawkins U. S. patent No. 1,559,733, November 3, 1925	707	1292
56—Fulton & Bowman U. S. patent No. 1,560,558, November 10, 1925	711	1295
57—Fulton & Bowman U. S. patent No. 1,560,559, November 10, 1925	713	1299
58—Fulton & Bowman U. S. patent No. 1,571,938, February 9, 1926	715	1302
59—Barger & Hawkins U. S. patent No. 1,508,607, September 7, 1926	717	1305
60—Letter, E. G. Dezell, December 19, 1924, "to all shippers," California Fruit Growers' Exchange	719	1307
61—Letter, E. G. Dezell, June 20, 1924, "to all shippers," California Fruit Growers' Exchange, with report of tests annexed	724	1312

	Original	Print
Plaintiff's Exhibit 62—Bulletins of California Fruit Growers' Exhange "to all shippers"	742	1329
63—Circular No. 524, Fruit Growers' Supply Co.	753	1338
64—Chart showing specific gravity of borax solutions	755	1339
65—Circular, Chase & Co., summary decay analysis	757	1340
66—Letter, H. R. Fulton to J. B. Skinner, November 17, 1924	759	1341
67—License agreement, dated September 9, 1924, between Brogdex Co. of Florida and Mutual Orange Distributors	760	1342
68—License agreement, dated June 18, 1926, between Brogdex Co. and Skinner Machinery Sales Co.	772	1352
69—Brogdex drawing of Haines City, Florida, plant of defendant	785	1362
70—Brogdex drawing of Volusia Growers, Inc., plant, De Land, Florida	786	1362
71—Brogdex drawing of New Smyrna, Mims, and Cocoa, Florida, plants	787	1362
72—License agreement, June 24, 1926, between Skinner Machinery Sales Co. and Brockett & Parrish	789	1363
73—Lease from Skinner Machinery Sales Co. to Brockett & Parrish	799	1372
74—Bulletin No. 495, U. S. Bureau of Standards, "A Radiometric Investigation of the Germicidal Action of Ultra-Violet Radiation," by Coblentz and Fulton	805	1377
75—Bulletins of Florida Citrus Exchange with license and lease agreement with Zeitrocide Chemical Corporation	853	1419
76—Delivery slip of Downing's Grocery & Meat Market to Rialto Heights Association, California	877	1435
77—Bill, Blue Goose Pharmacy to Rialto Heights Association	878	1435
78—Delivery slip of Downing's Grocery and Meat Market to Rialto Heights Association, California	879	1435
79—Bills (three) of Needham Brothers to Rialto Heights Association	880	1435
80—Shipping order Pacific Coast Borax Co. to Rialto Heights Association	883	1435
81—Horrell and Bryant U. S. patent No. 944,993, December 28, 1909	883a	1435

		Original	Print
Plaintiff's Exhibit	82—Telegram, April 28, 1926, B. C. Skinner to The Brogdex Co	889	1441
	82-A—Confirmation of telegram, Exhibit No. 82	890	1442
	83—"Problems in Shipping Citrus Fruits," by A. Sandlin	890	1442
	84—Check of E. V. Bauchelle to Rialto Heights Association	897	1447
	84-A—Bill of Rialto Heights Association to J. F. Bauchelle	898	1447
	85—"Insecticides, Fungicides, and Weed-killers," 1913, by E. Bourcart, pp. 97 and 208	899	1447
	86—"The Physiological Effect of Various Agents on the Development of Some Molds," by Bitting, p. 5 (addition to Defendant's Exhibit No. 17)	902	1450
Defendant's Exhibit	1—Defendant's decay sheets, season 1924-25	904	1453
	2—Defendant's decay sheets, season 1925-26	905	1456
	3—Circulars of defendant to packing house managers	907	1458
	4—Circulars of defendant to packing house managers, re use of borax	912	1462
	5—Letter, October 17, 1921, E. M. Brogden to A. B. Michael, with memorandum, "A Few 'Brogdex' Experiments, etc.," annexed	915	1464
	6—Articles of incorporation of Antiseptic Fruit and Egg Packing Co.	922	1470
	7—Bishop U. S. patent No. 638,899, October 8, 1901	927	1473
	8—Chart, tests of Blue Mold decay	929	1474
	9—Report of Dr. H. C. Gore on experiments with boric acid	931	1475
	10—Circular No. 27, August, 1922, U. S. Department of Agriculture, "Some Experiments with a Boric-acid Canning Powder"	939	1480
	11—Bulletin No. 109, U. S. Department of Agriculture, "The Molds of Cigars and Their Prevention"	953	1495
	12—Annual report, Commissioner of Agriculture, 1878, "Borax as a Preservative of Butter," p. 577	965	1504
	13—Journal d'Agriculture Practique, 1883, January 19, Vol. 46/I, pp. 75-76, translation	967	1506

	Original	Print
Defendant's Exhibit 14—Proceedings of Indiana Academy of Science, 1909, "The Effect of Preservatives on the Development of Penicillium," by Katherine G. Bitting	969	1507
15—Flolia Microbriologica, 1912, "On the Effect of Boric Acid and Several Other Compounds Upon the Development of Penicillium Glaucum and Aspergillus Niger," translation	977	1516
16—"Insecticides, Fungicides and Weed-killers," by E. Bourcart, 1913	984	1521
17—"The Effect of Certain Agents on the Development of Some Molds," by K. G. Bitting	987	1525
18—Chemistry of Plants, "Action of Boric Acid on Germination," by J. Morel, translation	996	1535
19—Spear U. S. patent No. 67,921, August 20, 1867	1001	1538
20—Donn U. S. patent No. 161,944, April 13, 1875	1005	1546
21—Am Ende U. S. patent No. 187,956, March 6, 1877	1006	1547
22—Jourdes U. S. patent No. 199,209, January 15, 1878	1007	1548
23—Jannasch U. S. patent No. 216,414, June 10, 1879	1008	1550
24—Fagersten U. S. patent No. 221,541, November 11, 1879	1009	1552
25—Hauff U. S. patent No. 234,567, November 16, 1880	1010	1554
26—Grier U. S. patent No. 268,094, November 28, 1882	1011	1555
27—Humiston U. S. patent No. 270,899, January 23, 1883	1012	1558
28—Pielsticker U. S. patent No. 281,554, July 17, 1883	1013	1559
29—Morris and Parker U. S. patent No. 556,471, March 17, 1896	1015	1563
30—De Sturler U. S. patent No. 694,301, February 25, 1902	1017	1566
31—Peters U. S. patent No. 1,245,380, November 6, 1917	1018	1568
32—McDill U. S. patent No. 1,400,086, December 13, 1921	1023	1574
33—Olsson British patent No. 1893 of 1869	1025	1578
34—Wilkins British patent No. 2438 of 1880	1032	1584

	Original	Print
Defendant's Exhibit 35—Nawrocki British patent No. 4910 of 1880	1033	1585
36—Wilkins British patent No. 140 of 1881	1035	1587
37—Barff British patent No. 1332 of 1881	1038	1590
38—Wetter British patent No. 3823 of 1881	1040	1593
39—Townsend British patent No. 6134 of 1882	1042	1594
40—Storer British patent No. 214 of 1888	1046	1598
41—Hausler British patent No. 9145 of 1893	1048	1601
42—Harvey British patent No. 25,512 of 1906	1050	1603
43—The Horticulturalist's Rule Book, 1898	1055	1611
44—Letter, L. D. Niles to W. E. Conner, September 29, 1909	1058	1613
45—Letter, L. D. Niles to Hon. Washington Conner, March 24, 1909	1059	1614
Clerk's certificate (omitted in printing)	1060	
Order allowing certiorari	1061	1615

[fols. a & 1]

IN UNITED STATES DISTRICT COURT, DISTRICT OF DELAWARE

No. 593. In Equity

BROGDEX COMPANY, Plaintiff,

v.

AMERICAN FRUIT GROWERS, INCORPORATED, Defendant

DOCKET ENTRIES

Apr. 15, 1926. Bill of complaint filed; same day subpoena issued, returnable May 5, 1926.

Apr. 15, 1926. Marshal returns on subpœna, "Served," &c.; same day writ filed.

Apr. 30, 1926. Report to Commissioner of Patents mailed and copy filed.

May 5, 1926. Defendant appears by Ward, Gray & Ward, its solicitors; same day præcipe filed.

May 5, 1926. Stipulation filed; same day order extending time to file answer until May 20, 1926; same day order filed.

[fol. 2] May 14, 1926. Stipulation filed; same day order extending time to file answer until June 4, 1926; same day order filed.

June 4, 1926. Answer filed.

Sept. 24, 1926. Stipulation filed; same day order extending time for taking depositions &c.; same day order filed.

Dec. 24, 1926. Depositions of William Sylvester Hart, Mrs. Laura Crews and Mrs. Carrie Tanner, taken on behalf of plaintiff, filed.

Dec. 27, 1926. Order granting leave to amend answer; same day amendment and order filed.

Dec. 27, 1926. Depositions of George Wood, A. J. Davis, E. D. Howard, Albert H. Morgan and A. P. Kelly on behalf of defendant, filed.

Dec. 27, 1926. Depositions of George W. Palmer, Fred J. Burden, Walter A. Robinson, Kirby Lowd Chilton, Jonas Meeks, and Gus Taylor on behalf of defendant; filed.

Dec. 29, 1926. Depositions of Gamaliel Wyatt Holmes, H. H. Allen, A. R. Sandlin, S. L. Harris, Minos E. Miller, J. C. Thompson, Albert E. Barnes and Shadrach D. Manning on behalf of defendant filed.

Jan. 18, 1927. Defendant's motion for a continuance, to amend answer and for leave to take depositions, with affidavits of H. H. Warner, filed.

[fol. 3] Jan. 18, 1927. Affidavit of Roy F. Steward on behalf of plaintiff filed.

Jan. 18, 1927. Hearing; same day order denying motions of defendant; same day order filed

Jan. 19, 1927. Depositions of Jeremiah Burns Booth and Wm. K. Turner taken on behalf of plaintiff filed.

Jan. 21, 1927. Stipulation filed; same day order granting leave to file amendment to answer; same day order and amendment filed.

Jan. 31, 1927. Trial before the Court.

Feb. 1, 2, 3, 4, 7, 1927. Trial before the Court.

Feb. 7, 1927. Record of proceedings at trial, filed.

Apr. 8, 1927. Hearing on pleadings and proofs.

Aug. 3, 1927. Opinion of Court, filed.

Sept. 26, 1927. Hearing on settlement of decree; same day decree that patent valid and infringed and that injunction issue; same day said decree filed.

Sept. 26, 1927. Injunction issued.

Sept. 27, 1927. Marshal returns on Injunction, "Served," &c.; same day writ filed.

Oct. 26, 1927. Petition of defendant for appeal with assignments of error, filed; same day order allowing appeal, bond in the sum of $500; same day order filed.

Oct. 28, 1927. Motion of defendant for supersedeas and stay of injunction, filed; same day hearing on said motion.

[fol. 4] Nov. 22, 1927. Order approving bond of defendant on appeal in the sum of $500, with Standard Accident Insurance Company, as surety; same day bond filed.

Nov. 22, 1927. Citation issued.

Nov. 22, 1927. Citation with acceptance of service endorsed thereon, filed.

Dec. 9, 1927. Order approving stipulation as to transcript of record; same day order and stipulation filed.

[fol. 5] IN UNITED STATES DISTRICT COURT

[Title omitted]

BILL OF COMPLAINT—Filed April 15, 1926

To the Honorable the Judges of the District Court of the United States for the District of Delaware:

The plaintiff for its bill of complaint alleges:

1. That the plaintiff, Brogdex Company, is a corporation organized and existing under the laws of the State of Florida, having a regular and established place of business at Winter Haven, Florida, and a principal place of business at Los Angeles, California; that the defendant, American Fruit Growers, Incorporated, is a corporation organized and existing under the laws of the State of Delaware, with an office and place of business at Wilmington, Delaware.

2. That this is a suit for the infringement of letters patent of the United States and the jurisdiction of this Court is invoked under the patent laws of the United States.

3. That prior to August 13, 1923, Ernest M. Brogden, residing at Santa Monica, Los Angeles County, California, and Miles L. Trowbridge, residing at Palms, Los An-
[fol. 6] geles County, California, both citizens of the United States, were the original, first and joint inventors of certain new and useful improvements in Art of Preparing Fresh Fruit for Market, not known or used by

others before their invention or discovery thereof, and not in public use or on sale in this country for more than two years prior to their application in this country for letters therefor, and not patented or described in any printed publication in this or any foreign country before their invention or discovery thereof, or for more than two years prior to their application for patent therefor in this country, not abandoned, not first patented or caused to be patented by them or their legal representatives or assigns in any foreign country upon an application filed more than twelve months prior to the filing of their application for patent in this country; and that said Ernest M. Brogden and Miles L. Trowbridge did, on August 13, 1923, duly file in the United States Patent Office an application in writing for letters patent of the United States for said invention, and having complied with all the requirements of law in that behalf, Letters Patent of the United States of America, No. 1,529,461, dated March 10, 1925, bearing the printed name and signature of the Commissioner of Patents, attested by a Law Examiner duly designated by the Commissioner, and sealed with the seal of the Patent Office and duly recorded, were duly granted and issued in the name of the United States of America to said Ernest M. Brogden and Miles L. Trowbridge, under and in accordance with the provisions of the then existing statutes of the United States and rules of practice in the United States Patent Office, as by reference to said patent, or to a duly authenticated copy thereof here in Court to be produced, will more fully and at large appear.

[fol. 7] 4. That the plaintiff by assignments in writing duly recorded in the United States Patent Office, became, and is now, and has been since the date of issue of said letters patent, the sole owner of said letters patent and of any and all claims for profits and damages arising out of any and all infringements of said letters patent, as by reference to said assignments, or duly authenticated copies thereof, here in Court to be produced, will more fully and at large appear.

5. That plaintiff has granted licenses under said letters patent to a considerable number of packers of fresh citrus fruit, who have treated and are treating large quantities

of fresh citrus fruit, and have sold and are selling the same, in accordance with the invention of said letters patent; that plaintiff has expended large sums of money in making said invention profitable to itself and useful to the public; that said invention has been and is of great benefit and advantage to the public, and the public generally have acknowledged and acquiesced in the rights of plaintiff thereunder.

6. That the defendant, said American Fruit Growers, Incorporated, both alone and in concert with others, has infringed upon said letters patent by treating large quantities of fresh citrus fruits, including oranges and grapefruit, in accordance with the invention set forth in said letters patent, and by selling the fruit so treated in this judicial district and elsewhere in the United States, without the consent of the plaintiff, and is continuing to do so, and has derived unlawful gains and profits from such infringement, which plaintiff would otherwise have received, and that defendant has, by such infringement, caused irreparable damage to plaintiff; that the plaintiff would, but for the wrongful acts and doings of said defendant and others acting in concert with it, have made large [fol. 8] gains, profits and advantages from the practice of the invention set forth in said letters patent; that the plaintiff would, but for the wrongful acts and doings of said defendant and others acting in concert with it, now be able to exclusively use the said invention secured to it by said letters patent with increased profit and advantage; but that, because of the wrongful acts and doings of the defendant and others acting in concert with it, the plaintiff has been and now is prevented and hindered from so doing; and the plaintiff believes that it will realize large gains and profits from said invention and letters patent if infringement by said defendant and its confederates shall be prevented.

7. That the defendant, said American Fruit Growers, Incorporated, was duly notified of said letters patent, No. 1,529,461, of plaintiff's rights thereunder, and of defendant's aforesaid infringement of said letters patent, but defendant continued, after such notice, to practice the said

process of treating fruit and to sell the resultant treated fruit, all in accordance with and embodying the invention set forth in and patented in and by said letters patent.

Wherefore plaintiff prays that a writ of injunction, issue out of and under the seal of this Court, enjoining and restraining the defendant, American Fruit Growers, Incorporated, its officers, directors, associates, attorneys, solicitors, clerks, servants, agents and workmen from infringing upon said letters patent; that said defendant account for and pay over to plaintiff the profits made by it and the damage sustained by plaintiff, by reason of said defendant's infringement aforesaid; that the matter of such damages and profits be referred to a Master of this Court with instructions to ascertain and assess the same and report thereon to this Court; that upon the rendition [fol. 9] of said report the actual damages ascertained and assessed be trebled in view of the willful and unjust infringement by said defendant; and that plaintiff recover the costs and disbursements of this suit; and plaintiff prays for such other and further relief as may appear proper and agreeable to Equity.

Plaintiff hereby waives verification of defendant's answer.

Brogdex Company, by (Sgd.) Wm. G. Mahaffy, Solicitor for Plaintiff. (Sgd.) Charles Neave, 5 Nassau Street, New York City; (Sgd.) Melville Church, McGill Building, Washington, D. C.; (Sgd.) R. F. Steward, 700 Tenth Street, N. W., Washington, D. C., of Counsel for Plaintiff.

[fol. 10] IN UNITED STATES DISTRICT COURT

ANSWER AS AMENDED—Filed June 4, 1926 *

The defendant, American Fruit Growers, Incorporated, answering the bill of complaint herein, alleges:

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* Amendments filed December 27, 1926, and January 21, 1927.

1. Defendant admits that it is a corporation organized and existing under the laws of the State of Delaware with an office and place of business at Wilmington, Delaware; defendant is not informed, save by the allegations of the bill of complaint, as to the corporate character of the plaintiff, its citizenship or place of business, and leaves the plaintiff to its proof thereof.

2. Defendant admits that this action is in form a suit for infringement of Letters Patent of the United States and that this Court has jurisdiction thereof.

3. Defendant admits that an application for Letters Patent of the United States was duly filed in the United States Patent Office on August 13, 1923, in the names of Ernest M. Brogden and Miles L. Trowbridge, and that thereafter, to wit, on March 10, 1925, Patent No. 1,529,461 issued on such application in the names of said Brogden and Trowbridge, but defendant denies that the said Brogden and Trowbridge were the original, first and joint inventors of the alleged new and useful improvements in the art of preparing fresh fruit for market purporting to be set forth in said application or in said letters patent, and defendant denies that the same was not known or used by others in this country before their alleged invention or discovery thereof; denies that the same were not patented of described in any printed publication in this [fol. 11] or any foreign country before their alleged invention or discovery thereof, or more than two years prior to the said application for letters patent; denies that the same were not in public use or on sale in the United States for more than two years prior to the said application for letters patent; and defendant denies on information and belief that the same were not abandoned by the said Brogden and Trowbridge; denies on information and belief that the same were not first patented or caused to be patented by them or their legal representatives or assigns in any foreign country on an application filed more than twelve months prior to the filing of the application for patent in this country, and denies that the said Brogden and Trowbridge did in all respects comply with the requirements of the law in such cases made and provided.

4. The defendant has no knowledge or information sufficient to form a belief as to whether by assignment in writing or otherwise the whole or any part of the right, title and interest in and to the said alleged invention of the said Brogden and Trowbridge, or in and to the said letters patent therefor, or the right to recover damages or profits for the infringement of such patent passed to or were acquired by the plaintiff, Brogder Company, and therefore denies the allegations of paragraph 4 of the bill of complaint and leaves the plaintiff to its proof thereof.

5. Defendant denies the allegations of paragraph 5 of the bill of complaint and in further answer thereof, defendant alleges that the public generally have not acquiesced in the alleged rights of plaintiff to said patent No. 1,529,461, but on the contrary, the public generally and the fruit-growing and packing industry in particuair, regard said patent as invalid and void.

[fol. 12] 6. Defendant denies that it has at any time or in any manner infringed upon said letters patent, and denies that it has, without the consent of the plaintiff, treated citrus fruits in accordance with any invention set forth in said letters patent, and denies that it sold fruit so treated in this judicial district or elsewhere in the United States; and defendant denies that plaintiff is entitled to any profits made by this defendant in any manner whatsoever; denies that defendant has been damaged by any action whatsoever of defendant; and denies each and every charge of infringement and each and every of the allegations contained in paragraph 6 of said bill of complaint.

7. Defendant denies that it has received sufficient or any notice of said Letters Patent No. 1,529,461 or of plaintiff's alleged rights thereunder, or of defendant's alleged infringement thereof.

And further answering, defendant alleges:

8. That the said Letters Patent No. 1,529,461 were issued with claims of invention other than, and different and distinct from, the invention or inventions set forth and claimed in the original application for said letters patent and without any new or additional oath by the applicant, such as

is required by the statute as a condition of the grant of letters patent, and for that reason the said letters patent were and are void.

9. That the said Letters Patent No. 1,529,461 were and are invalid and void because the alleged inventions and discoveries described and claimed therein, and all the material and substantial parts thereof, had been, prior to the alleged invention and discovery thereof by said Brogden and Trowbridge, patented, described and published in the following United States and foreign letters patnt:

[fol. 13] United States Letters Patent

No. 67,921, Aug. 20, 1867, Spear.
" 161,944, Apr. 13, 1875, Donn.
" 187,956, Mar. 6, 1877, Ende.
" 199,209, Jan. 15, 1878, Jourdes.
" 216,414, June 10, 1879, Jannasch.
" 221,541, Nov. 11, 1879, Fagersten.
" 229,042, June 22, 1880, Holland.
" 234,567, Nov. 16, 1880, Hauff.
" 268,094, Nov. 28, 1882, Grier.
" 270,899, Jan. 23, 1883, Humiston.
" 281,554, July 17, 1883, Maria.
" 413,249, Oct. 22, 1889, Wuerpel.
" 556,471, Mar. 17, 1896, Morris et al.
" 683,899, Oct. 8, 1901, Bishop.
" 1,166,588, Jan. 4, 1916, Hoffman.
" 1,245,380, Nov. 6, 1917, Peters.
" 1,400,086, Dec. 13, 1921, McDill.
" 1,450,408, Apr. 3, 1923, Brooks.
" 694,301,* Feb. 25, 1902, De Sturler.

British Letters Patent

No. 2438, June 16, 1880, Wilkins.
" 4910, Nov. 25, 1880, Nawrocki.
" 1332, Mar. 25, 1881, Barff.
" 3823, Sept. 2, 1881, Wetter.
" 6134, Dec. 23, 1882, Townsend.

* Added by amendment December 27, 1926.

No. 9145, May 8, 1893, Häusler.
" 25512, — of 1906, Harvey.
" 1893,* June 21, 1869, Olsson.
" 2744,* Aug. 4, 1875, Loomis.
" 140,* Jan. 12, 1881, Wilkins.
" 214,* Jan. 5, 1888, Storer.
" 3325,* Feb. 15, 1895, Beveridge.

[fol. 14] also in other United States and foreign letters patent now unknown to this defendant, but which when known it prays leave, by proper amendment, to insert in this answer.

10. That the said Letters Patent No. 1,529,461 were and are invalid and void, because the alleged inventions purporting to be patented and described and claimed in said letters patent and every material and substantial part thereof, were, prior to the supposed invention thereof by the said Brogden and Trowbridge, published and described in:

†"Annual Report of the Commissioner of Agriculture, 1878," page 577, published by the Government Printing Office at Washington, 1879.

"Journal d'Agriculture Pratique," January 19, 1883, pages 75-76, 46° Annee Tome 1, published by Libarie Agricole De La Maison Rustique, Rue Jacob, 26, A Paris.

"Proceedings of the Indiana Academy of Science, 1909," pages 391 through 410, published at Indiana, 1910.

"Folio Microbiologica," I. Jahrgang, 1912, pages 342 through 358, published by Administration und Verlag der Folia Microbiologica; Phoenixstraat 18, Delft.

"Insecticides, Fungicides and Weedkillers," by E. Bourcart, pages 109 and 110, published in London, Scott, Greenwood & Son, 8 Broadway, Ludgate, E. C., 1913.

"The Effect of Certain Agents on the Development of Some Moulds," by K. G. Bitting, particularly pages 5, 24 [fol. 15] through 27, 46 and 47 thereof, published by Glass Cont. Asso. of America, Chicago, Ill., 1913.

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* Added by amendment December 27, 1926.

† List of Publications added by amendment December 27, 1926.

"Comptes Rendu des Seances al L'Academie des Sciences, Volume 114, January-June, 1892, pages 131 through 133, particularly the last, published by Gauthier-Villars et Fils, Quai des Grands-Augustins, 55, 1892,"

and in addition in numerous printed publications now unknown to this defendant but which, when ascertained, it prays leave by proper amendment to insert in this answer.

11. That said Letters Patent No. 1,529,461 were and are valid and void, because the said Brogden and Trowbridge were not the original and first inventors or discoverers of the alleged invention or inventions purporting to be patented in and by said letters patent, but that the same, and every material and substantial part thereof, were, prior to the alleged invention thereof by the said Brogden and Trowbridge, invented, if there is any patentable invention described and/or claimed therein, by or known to and used by the patentees of the foregoing United States Letters Patent set forth in the ninth paragraph hereof, whose residences are stated in their respective patents, at their said places of residence, and elsewhere,

*F. S. Pond, now dead, formerly of Tavares and Eustis, Florida, at Tavares and Eustis, Florida;

B. F. Chilton, now dead, formerly of New Symrna, Florida, in the packing houses of the Ronnoc Groves at New Smyrna, Florida;

George W. Palmer, of Emporia, Florida, at Emporia, Florida;

[fol. 16] J. C. Thompson, of Tavares, Florida, at Tavares, Florida;

Albert E. Barnes, of Miami, Florida, at Ocala, Florida;

W. J. Krome, of Homestead, Florida, at Homestead, Florida;

T. J. Peters, of Peters, Florida, at Peters, Florida;

A. J. Davis, of Corona, California, at Corona, California;

E. D. Howard, of Duarte, California, at Corona, California;

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* List added by Amendment December 27, 1926.

Albert H. Morgan, of Rialto, California, at Rialto, California;

and by other persons whose names and residences are not at present known to this defendant, but which, when ascertained, it prays leave by proper amendment to insert in this answer.

12. That the said Brogden and Trowbridge surreptitiously and unjustly obtained said Letters Patent No. 1,529,461 for that which was in fact invented by J. R. Winston, of Orlando, Florida, and William R. Barger, of Riverside, California, both formerly scientific research workers of the Department of Agriculture stationed at Orlando, Florida, who were using reasonable diligence in adapting and perfecting the same, and by others whose names and residences are not at present known to this defendant, but which, when ascertained, it prays leave by proper amendment to insert in this answer.

13. That said Letters Patent No. 1,529,461 were and are invalid and void because the alleged inventions purporting to be patented therein were in public use or on sale in the [fol. 17] United States by the said Brogden and Trowbridge at their places of residence for more than two years prior to any application for letters patent for said alleged invention by said Brogden and Trowbridge, and that the said alleged invention of Letters Patent No. 1,529,461 were abandoned to the public by said Brogden and Trowbridge.

14. *That said Letters Patent No. 1,529,461 were and are invalid and void because the alleged inventions purporting to be patented therein were, for more than two years prior to any application for letters patent for said alleged invention by said Brogden and Trowbridge, in public use and on sale in the United States by the following persons at the places indicated:

F. S. Pond, now dead, formerly of Tavares and Eustis, Florida, at Tavares and Eustis, Florida;

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* New paragraph 14 inserted by amendment January 21, 1927.

B. F. Chilton, now dead, formerly of New Smyrna, Florida, in the packing houses of the Ronnoc Groves at New Smyrna, Florida;

George W. Palmer, of Emporia, Florida, at Emporia, Florida;

J. C. Thompson, of Tavares, Florida, at Ocala, Florida;

W. J. Krome, of Homestead, Florida, at Homestead, Florida;

T. J. Peters, of Peters, Florida, at Peters Florida;

A. J. Davis, of Corona, California, at Corona, California;

[fol. 18] E. D. Howard, of Duarte, California, at Corona, California;

Albert H. Morgan, of Rialto, California, at Rialto, California.

15. That the said Letters Patent No. 1,529,461 were and are invalid and void because the invention or inventions purporting to be patented thereby did not constitute patentable novelty or invention within the meaning of the patent law, in view of the prior state of the art and in view of what was common knowledge on the part of those skilled in the art, all prior to the date of the alleged invention of the said letters patent by the said Brogden and Trowbridge.

16. That said Letters Patent No. 1,529,461 were and are invalid and void, because for the purpose of deceiving the public the description and specification filed by said Brogden and Trowbridge in the United States Patent Office were made to contain less than the whole truth relevant to their alleged invention, or more than was necessary to produce the desired effect.

17. That on account of the proceedings of the said Brogden and Trowbridge in the prosecution of their application in the United States Patent Office and of the decisions of the United States Patent Office rendered and filed in the course of said proceedings, in which decisions said Brogden and Trowbridge acquiesced, the plaintiff is estopped to assert that the said letters patent are of a scope to cover any method of preparing fruit for market or any fruit prepared and sold by this defendant.

18. That prior to the filing of the application for Letters Patent No. 1,529,461, and also while said application

was pending in the United States Patent Office, the United [fol. 19] States Department of Agriculture, with full knowledge of plaintiff and the said Brogden and Trowbridge, recommended to fruit growers throughout the country, certain methods of preparing fruit for market embodying in whole or in part the alleged inventions purporting to be covered by the said Letters Patent No. 1,529,461, and plaintiff and the said Brogden and Trowbridge acquiesced in said recommendation by the Department of Agriculture and did not at any time assert to the United States Department of Agriculture or anyone that the practice of the processes so recommended constituted a practice of the process for which they were seeking patent protection by their said application; wherefore this plaintiff is estopped from asserting that the practice of any process recommended by the United States Department of Agriculture with the acquiescence of plaintiff and said Brogden and Trowbridge or the product of such processes constitute infringement of said letters patent.

19.* That claims 23 through 28 of said Letters Patent No. 1,529,461 are invalid and void because fresh fruit is not an art, machine, manufacture or composition of matter within the meaning of the patent statutes, and is therefore unpatentable.

Wherefore the defendant prays that the bill of complaint be dismissed with costs.

(Sgd.) Ward, Gray & Ward, Solicitors for Defendant. W. B. Morton, R. T. M. McCready, of Counsel.

[fol. 20]. In United States District Court

Stipulation as to Facts, etc.—Filed September 24, 1926

It is hereby stipulated and agreed:

1. That the plaintiff Brogdex Company is a corporation organized and existing under the laws of the State of

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*Added by Amendment December 27, 1926.

Florida, having a regular and established place of business at Winter Haven, Florida, and a principal place of business at Los Angeles, California.

2. That the plaintiff Brogdex Company is now and has been since the date of issue of said letters patent in suit No. 1,529,461 the sole owner of said letters patent and of any and all claims for profits and damages arising out of any and all infringements of said letters patent.

3. That at the trial of the above entitled cause printed Patent Office copies of specifications and drawings of Letters Patents of the United States and photostat copies of Letters Patent of Great Britain and other foreign countries may be introduced and shall be received in evidence with the same force and effect as original letters patents or duly certified copies thereof, as to all the facts set forth in said printed copies, or photostats, including the dates of issuance thereof; and that photostat copies of publications may be introduced and shall be received in evidence with the same force and effect as the originals, and that such publications were published on the respective dates they bear purporting to be the date of publication; all subject to correction by other proof.

4. That at the trial of the above entitled cause the plaintiff will rely only upon claims 1, 2, 3, 4, 5, 6, 7, 9, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27 and 28 of the patent in suit, No. 1,529,461.

[fol. 21] 5. That the times for taking depositions before trial of witnesses residing more than 100 miles from the place of trial be extended as follows, the Court consenting:

Those of the plaintiff and defendant up to November 1, 1926; and rebutting depositions by either party up to November 15, 1926.

(Sgd.) Wm. G. Mahaffy, Solicitor for Plaintiff. (Sgd.) Charles Neave, of Counsel. (Sgd.) A. C. Gray, Solicitor for Defendant. (Sgd.) W. B. Morton, (Sgd.) R. M. McCready, of Counsel.

September 24, 1926.

The elimination or reduction of decay of citrus fruit during transportation to market constitutes the problem dealt with in the patent in suit No. 1,529,461 issued March 10, 1925 to Brogden & Trowbridge and assigned by them to Brogdex Company, the plaintiff. The decay sought to be prevented is due mainly to parasitic fungi, penicillium or blue mold, the spores of which find lodgement and germinate, most frequently, in lesions in the skin of the fruit. The patentee's solution of the problem is set out in these characteristic claims:

[fol. 22] "3. In the preparation of fresh fruit for market, the process which comprises subjecting fruit to the action of an aqueous solution of borax, the fluidity, strength and temperature of the treating solution, and the duration of the treatment, being such that exposed rind or skin tissues of the fruit are effectively impregnated with borax and rendered resistant to blue mold decay, while at the same time the fruit is not scalded nor is its freshness or edibility otherwise substantially impaired."

"26. Fresh citrus fruit of which the rind or skin carries borax in amount that is very small but sufficient to render the fruit resistant to blue mold decay."

Other process claims in suit are Nos. 1, 2, 4, to 7 inclusive, 9 and 14 to 18 inclusive. Other product claims are Nos. 23 to 25, inclusive.

The defendant, American Fruit Growers, Incorporated, admits that it dips its fruit in a borax solution to check blue mold decay. This practice it seeks to justify by the disclosures of the prior art and by asserted prior uses. It contends that the process of the patent in suit embraces broadly all uses of solutions of compounds of boron, particularly borax or boric acid, of sufficient strength to inhibit or retard the growth of blue mold and that, consequently, the claims of the patent are made invalid by the prior art and prior uses. That borax and boric acid have long been known to possess antiseptic properties and long been used as preservatives of animal and vegetable matter is here

established beyond question. They were so used both dry and in solution. The solutions were both hot and cold. The use of a hot solution of boric acid or its salts to prevent the growth of fungi or mold upon cured meats by immersing or dipping them into the solution was disclosed as early as 1879. As early as 1888 boric acid and its salts were used in packing material such as sawdust, chaff and shavings, [fol. 23] for the preservation of "all kinds of fresh fruits during storage or their transportation to near or distant markets." It was even found that many species of penicillium molds were more or less affected by boric acid and its salts. Yet the record before me discloses with equal certainty that, notwithstanding the well-known properties of the boron radical, supplemented by the teachings with respect to its particular uses and manner of use found in the later publications, for a quarter of a century the search for a specific for the blue mold decay of citrus fruit during transportation continued unabated, but in vain. Chemicals of widely varying degrees of toxicity were tried and abandoned. Every trial of new means, of whatsoever character, for reducing the decay ended but in a return to the conviction that in the long taught and long practiced careful handling of the fruit and avoidance of wounds and bruises lay the only hope of minimizing the decay. In this practice, standing alone and unaided, every injured orange was a cull. If shipped, the injured orange became a potent agency for the spread of decay. To eliminate the loss arising directly from the exclusion of the injured orange and the far greater indirect loss from its inclusion, inadvertent or otherwise, in the shipment, a remedy supplementing careful handling was long desired and greatly needed. Brogden and Trowbridge were the first to supply it. They departed from the idea that no relief was to be had save by more and more careful handling or by the use of chemicals so toxic as to destroy the mold and spores and turned to the use of a mold inhibiting reagent comprising the boric acid radical to render the surface of the fruit, and particularly the wounds, unfavorable as a medium for blue mold development. But their invention, as I understand it, is not the mere use of borax or boric acid, nor of the use of that force in a specific manner, but it consists in the

[fol. 24] subjection of a specific object to the influence of a specific force acting through a specific mode of application to produce a specific result. See Robinson on Patents §§ 261-263. Such process is nowhere found in the disclosures of the prior art though it is true that, viewed retrospectively and ignoring the long unsuccessful search for a remedy, the claimed process would seem to be wanting in invention over the disclosures of the prior art. Yet, I am convinced that the long, unsuccessful search must stand as a bar to such conclusion unless the failure sooner to resort to the claimed process is satisfactorily explained. Solved problems frequently beget conclusions that the solution was logically deducible from the prior art but such after-the-event views are unavailing when inconsistent with prior efforts and failures, particularly if the result was greatly needed and long sought. Walker, Secs. 26 and 42. The decay directly attributable to blue mold amounted in some cases to as much as 30 to 40 per cent. of the shipments. The resulting losses were enormous. Time and time again the shippers in their distress turned to the Department of Agriculture but to their inquiry the uniform answer throughout the years, until the invention of Brogden and Trowbridge, was the despairing one that nothing had been found that could be put into the wash that was effective against blue mold, that "the only thing to do is to keep the fruit free from injuries." The only explanation offered by the defendant of the long search and failure is the theory that the Pure Food and Drugs Act of 1906, 34 Stat. 768, acted as a deterrent to the use of borax as a food preservative. But, aside from the fact that by the claimed process only the skin or non-edible portion of the citrus fruit is impregnated with the borax, the record discloses that prior to the passage of the act the Department experimented with [fol. 25] the treatment of citrus fruits with boric acid to prevent blue mold decay and abandoned the experiments because of the conclusion that no permanent check of the growth of the fungus was obtainable thereby. Moreover, it likewise discloses that thereafter the Department reported to the growers from time to time that it had experimented with the use of antiseptics, disinfectants and fungicides in the wash and that it had not obtained any results that were worth noting. This evidence renders impossible

a conclusion that the long delay in the arrival at the solution of the problem was attributable to the Pure Food and Drugs Act. Consequently, I must conclude that invention was not wanting and that the process claims are valid unless invalidated by the alleged prior uses.

The alleged prior uses relied upon are many. That borax was used in the preparation of citrus fruits for market by several persons prior to the date of the invention in suit cannot, I think, be seriously questioned. But borax is a cleansing agent and frequently used as a washing powder as well as an antiseptic and preservative. That it was used by anyone prior to Brogden and Trowbridge for the purpose of preventing decay and in such manner as effectively to prevent decay or otherwise than as a washing powder is not established by the evidence with that degree of certainty which is required with respect to prior uses.

The cases relied upon to show invalidity of the product claims are cases dealing with a manufacture under the tariff acts and not under the patent law. That term, as used in the patent law, is broad enough, as I understand it, to include the product of the product claims in suit.

As the claims in suit are valid and as the defendant not only uses borax but uses it in the specific manner and for [fol. 26] the specific purpose called for by the claims in suit, the prayers of the bill must be granted.

(Sgd.) Hugh M. Morris, J.

August 3, 1927.

IN UNITED STATES DISTRICT COURT

INTERLOCUTORY DECREE—Filed September 26, 1927

And now, to wit, this twenty-sixth day of September, A. D. 1927, this cause having come on to be heard at this term, and argued by counsel for the respective parties; and thereupon, upon consideration thereof, it is ordered, adjudged and decreed as follows, viz.:

1. That Ernest M. Brogden and Miles L. Trowbridge, were the first, original and joint inventors of the inventions described in and particularly recited in claims 1, 2, 3, 4, 5, 6, 7, 9, 14, 15, 16, 17, 18, 23, 24, 25 and 26 and each of them,

of United States Letters Patent No. 1,529,461, issued March 10, 1925, for Improvements in the Art of Preparing Fresh Fruit for Market.

2. That said Letters Patent No. 1,529,461, are, as to said claims 1, 2, 3, 4, 5, 6, 7, 9, 14, 15, 16, 17, 18, 23, 24, 25 and 26, and each of them, good and valid in law and that the title to said inventions and letters patent, including all claims and demands for infringement of said letters patent is duly vested in the plaintiff, Brogdex Company.

3. That the defendant, American Fruit Growers, Incorporated, has infringed upon claims 1, 2, 3, 4, 5, 6, 7, 9, 14, [fol. 27] 15, 16, 17 and 18 of said Letters Patent No. 1,529,461, by treating fruit in accordance with the methods described in and secured by the said claims, and each of them, and also has infringed upon claims 23, 24, 25 and 26 thereof, and each of them, by making and vending to others treated fruit embodying the invention described in and secured by the said claims, and each of them.

4. That the plaintiff do recover from said defendant, American Fruit Growers, Incorporated, the profits which it has derived, received or made by reason of its aforesaid infringement upon said claims 1, 2, 3, 4, 5, 6, 7, 9, 14, 15, 16, 17, 18, 23, 24, 25 and 26, and each of them of said Letters Patent No. 1,529,461, and that the plaintiff do also recover from said defendant any and all damages it has sustained by reason of said infringement, the account to be taken and stated and the damages to be assessed by proceedings appropriate for such purpose.

5. That a perpetual injunction issue out of and under the seal of this Court directed to said defendant, American Fruit Growers, Incorporated, and its officers, directors, associates, attorneys, solicitors, clerks, servants, agents and workmen, and all claiming or holding under or through said defendant, enjoining and restraining them, and each of them, during the remainder of the term for which said Letters Patent No. 1,529,461, were or may be granted, from using or practicing any process embodying the invention described in said letters patent and secured by any of said claims 1, 2, 3, 4, 5, 6, 7, 9, 14, 15, 16, 17, and 18, thereof, and from the manufacture, sale, or use, in any manner, of

treated fruit embodying and containing the invention described in said letters patent and secured by any of said claims 23, 24, 25 and 26 thereof.

[fol. 28] 6. That the plaintiff do recover from defendant its taxable costs and disbursements in this Court, and that the question of increase of damages as prayed for in the bill of complaint be reserved until the coming in of the Master's report.

(Sgd.) Hugh M. Morris, United States District Judge.

IN UNITED STATES DISTRICT COURT

ASSIGNMENT OF ERRORS—Filed October 26, 1927

Now comes the above-named defendant, American Fruit Growers, Incorporated, by its solicitors, and presents with its accompanying petition for appeal from the interlocutory degree entered herein on the twenty-sixth day of September, 1927, the following assignment of errors:

The Court was in error:

1. In holding that Ernest M. Brogden and Miles L. Trowbridge were the first, original and joint inventors of the inventions described in and particularly recited in claims 1, 2, 3, 4, 5, 6, 7, 9, 14, 15, 16, 17, 18, 23, 24, 25 and 26 and each of them, of United States Letters Patent No. 1,529,461 issued March 10, 1925, for Improvements in the Art of Preparing Fresh Fruit for Market.

2. In holding that said Letters Patent No. 1,529,461, are as to said claims 1, 2, 3, 4, 5, 6, 7, 9, 14, 15, 16, 17, 18, 23, 24, 25 and 26, and each of them, good and valid in law and that the title to said inventions and letters patent, including all claims and demands for infringement of said letters patent, is duly vested in the plaintiff, Brogdex Company.

[fol. 29] 3. In holding that the defendant, American Fruit Growers, Incorporated, has infringed upon claims 1, 2, 3, 4, 5, 6, 7, 9, 14, 15, 16, 17 and 18 of said Letters Patent No. 1,529,461, by treating fruit in accordance with the methods described in and secured by the said claims, and each of them, and also has infringed upon claims 23, 24, 25 and 26

thereof, and each of them, by making and vending to others treated fruit embodying the invention described in and secured by the said claims, and each of them.

4. In holding that the plaintiff recover any profits or damages from the defendant and in ordering an accounting of profits and damages.

5. In ordering that a perpetual injunction issue.

6. In ordering that the plaintiff recover from defendant any costs and disbursements.

7. In not ordering the bill of complaint dismissed.

(Sgd.) A. C. Gray, (Sgd.) E. E. Berl, Solicitors for Defendant-Appellant. (Sgd.) George E. Middleton, of Counsel.

October 26, 1927.

[fol. 30] IN UNITED STATES DISTRICT COURT

In Equity. No. 593

BROGDEX COMPANY, Plaintiff,

v.

AMERICAN FRUIT GROWERS' INCORPORATED, Defendant

Statement of Evidence

Wilmington, Delaware, Monday,
January 31st, 1927, at 11.30 o'clock A. M.

Before Hon. Hugh M. Morris, U. S. District Judge

APPEARANCES OF COUNSEL

Charles Neave, Esq., Melville Church, Esq., Roy F. Steward, Esq., and William G. Mahaffy, Esq., Alexander C. Neave, Esq., of Counsel for Plaintiff.

R. T. M. McCready, Esq., W. B. Morton, Esq., George E. Middleton, Esq., Ward, Gray & Ward, Esqs., by E. E. Berl, Esq., of Counsel for Defendant.

[fol. 31] PLAINTIFF'S OPENING STATEMENT

Mr. Neave, after opening for plaintiff, proceeds and asks the Court if it wants to hear from the defendant's counsel before Mr. Neave begins the proofs for the plaintiff.

The Court inquires whether counsel for the defendant prefers to state the issues from his standpoint before the case opens or reserve that until after the plaintiff closes.

Mr. Morton, for the defendant, states that he would rather reserve it until after the plaintiff closes.

Whereupon, Mr. Neave states that it is agreed that the plaintiff, the Brogdex Company, is a corporation organized and existing under the laws of the State of Florida, having a regular and established place of business at Winter Haven, Florida, and a principal place of business at Los Angeles, California; that it is agreed that printed Patent Office copies of specifications and drawings of United States Patents and photostat copies of foreign patents may be introduced and shall be received in evidence with the same force and effect as originals or duly certified copies, as to all facts set forth in those printed copies or photostats, including dates of issuance thereof; and that photostat copies of publications may be introduced and shall be received in evidence with the same force and effect as the originals, and that such publications were published on the respective dates they bear purporting to be the dates of publication; all subject to correction by other proof.

Mr. Neave offers in evidence a printed Patent Office copy of the patent in suit, being Patent No. 1,529,461.

(The same was received in evidence and marked "Plaintiff's Exhibit No. 1.")

The plaintiff, by Mr. Neave, then states that it relies upon claims 1 to 7 inclusive; 9, 14 to 18 inclusive; and 23 to [fol. 32] 26 inclusive; that it is agreed that the plaintiff is now, and has been since the issue of the patent in suit, the sole owner of said patent and of any and all claims for profits and damages arising out of any and all of the infringements thereof; that it is agreed that the attorneys for the plaintiff on April 3, 1926, and again on April 10, 1926, addressed to the defendant notices of the plaintiff's ownership of the patents and the defendant's alleged infringe-

ment thereof, and that these letters were both received on April 13th.

Th Court asks if that is stipulated, and counsel for defendant answers in the affirmative.

Plaintiff's Exhibits Nos. 2 through 59 are offered and received in evidence subject to the following limitation:

Mr. Neave: I assume it to be understood I am offering this in evidence as showing the information that was disseminated in the art, not as proof of the correctness of the facts, as stated here, because many of them are incorrect, but as proof of what the art was being tanght in those days.

It was agreed that Plaintiff's Exhibit 44 was reprinted in The Citrus Industry, published in 1925, and that Plaintiff's Exhibit 50 was reprinted in The Citrus Industry for September, 1925.

Plaintiff's Proofs

Reginald L. Knox

Reginald L. Knox, of Pomona, California, called as a witness on behalf of the plaintiff, testified as follows:

Direct examination:

I have been connected with the citrus industry since December, 1899. At that time I was in the office of the California Fruit Growers' Exchange in Los Angeles and worked [fol. 33] up through the various departments and was transferred to San Francisco in 1906, after the fire, where I was assistant agent until 1908, when I came to Pomona in the capacity of assistant manager of the San Antonio Fruit Exchange and in 1917 I became manager of the San Antonio Fruit Exchange and that is my present position.

The San Antonio Fruit Exchange is part of the California Fruit Growers' Exchange; it is one of the twenty-two district exchanges. The district exchange is composed of associations in a particular locality and it acts as the selling agent of those associations. There are twenty-two of these districts exchanges and they combine to form the California Fruit Growers' Exchange, which is the clearing house and provides the facility through which these twenty-

two units sell. The growers themselves do not directly sell their fruit. The growers form the association and then the association picks, packs and ships the fruit and then groups of associations are formed in these localities and form the district exchange. The San Antonio Fruit Exchange is one of the district exchanges of the California Fruit Growers.

There are seven associations in our San Antonio Exchange and nine packing houses. The average annual pack of fruit of our San Antonio Exchange is about four thousand cars or 1,600,000 boxes, and that would represent about 8 per cent of the total of the California Fruit Growers' Exchange shipments. This includes 125,000 boxes of lemons and about 10,000 to 12,000 boxes of grape fruit. The balance is all oranges. Our exchange is one of the largest. I am a director of the California Fruit Growers' Exchange.

Prior to 1925 there was much loss in the industry in general due to the blue mold decay of fruit. We have estimated from time to time that prior to 1924 the losses would run from one million dollars to sometimes as high as two [fol. 34] million dollars in a year. We have certain periods of time where the loss will run very heavy, a period where the fruit is shipped immediately after a rain or heavy wind storm, and in those periods we have sometimes as high as 30 per cent of the cars showing quite heavy decay. Our losses from our actual records would run around thirty to fifty thousand dollars in a week in those periods. Sometimes those periods extend for ten or twelve weeks. Those will happen periodically from year to year. In those periods the losses were from 50 cents to as high as a dollar a box on every box that shows decay in the decay cars. These figures include all kinds of decay. Most of the decay would be blue mold; that is what is commonly the cause of the heavy decay. The figures I have given do not necessarily relate to a period prior to 1924. Our heaviest losses would be prior to that time.

All but one of our associations use in their packing houses the borax treatment under license from the patent in suit. This borax treatment is generally used in the following manner: The borax is put into a large soaking tank and the fruit immersed in that solution and from there it

goes into cylinder brushes, where it is sprayed with the same water that is in the tank, and from that it goes under a rinse of pure water and from there to the regular packing machinery. The strength of solution used is about 6½ per cent. This process is commercially referred to as the Brogdite process.

The best illustration of the saving of decay loss as a result of our use of the Borax treatment that we had of course is where all of them are not using it, where we could compare similar fruit in 1923-1924. The season of 1923-1924 we had the Walnut Fruit Growers' Association using the Brogdite process and the other houses were not. That was a year of heavy decay and our average for that season was approximately 6[illegible]% per cent of the shipments of the San [fol. 7] Antonio Fruit Exchange showing decay, and the Walnut House, and their shipments were included in that average, showed only 3.4 per cent decay as I recall the figures. The Walnut House shipped entirely under ventilation, while the other houses used refrigeration. Shipping under ventilation means shipping without ice in the ice bunkers with instructions to the railroad to open the vents wherever the temperature is over 32 degrees, and closing if under that.

Prior to the use of the Brogdite process the method used by our associations to reduce blue mold decay was simply careful handling and then refrigeration. Careful handling was used in picking and in every operation, in hauling the fruit to the packing house and in every operation that we could control from the tree to the car. Our exchange furnishes the picking crews that go around to pick the fruit in practically every instance. Sometimes the grower hauls the fruit to the various exchanges which are the packing houses, but mostly the association.

The kind of injury that oranges are likely to be subjected to in picking if one is not careful are clipper cuts, that is, injury from the clippers, long stems, graves in the box, nails in the picking box, anything of that kind which will puncture the skin. These careful picking and handling methods were not successful in preventing decay. They reduced it but did not prevent it. You understand, just to get that point clear, we have dead brush in trees and a picker will scratch the orange without any fault of his, and

injure the skin in that way. It is injury to the skin which gives the trouble.

We have had good success in retarding decay by precooling and refrigeration, but we have always had to impress upon every one handling the fruit the necessity for more careful handling under those conditions because there [fol. 36] we delayed the shipment of fruit and simply retarded the decay and we had disaster unless we were not very careful. Fruit after it has been taken out of refrigeration has a tendency to decay more rapidly. Prior to 1923 we had never heard of any successful method of controlling blue mold other than reducing it by careful operation.

I was familiar also with a so-called Brogdex process. I understood that to be a paraffin coating of the fruit which we were experimenting with from the time Mr. Brogden came to California in 1922. He investigated in 1921. We made experiments on the paraffin treatment in 1922 and we shipped commercially under that process. Each of our seven companies advanced some money to help develop the process of Mr. Brogden. We got good results from the use of this paraffin process alone at times and then periodically we would run into very heavy decay.

I first heard of borax or any boric acid compound being used in connection with fruits in the fall of 1923 from Mr. Brogden and Mr. Brogden's company. We used a borax solution in the fall of 1923 in one packing house, the College Heights Orange & Lemon Association of Claremont, on the last end of our oranges. At that time we were trying to bring out the color on the Valencias and it was at the time that we were using ethylene gas for bringing out the color on the fruit and we got severe spotting on that particular lot of shipments so that we could not say that we got good results from the borax that fall. Then the Brogdex Company made an experimental shipment of loose fruit to Cleveland to show us that the decay or spotting condition was not due to the treatment of the borax but rather to the gassing methods we were using. This shipment was returned from Cleveland in the same car and it came back in a refrigerator car and the fruit was solid and did not have blue mold decay. That led us to believe that there [fol. 37] was merit in the borax so that we went ahead to use it commercially next year in another house.

This gassing that I spoke of was used to bring out the color on the Valencias after they are turned green. If they are allowed to hang on the tree during the summer months, we gas the Valencias to bring out the yellow color.

In the year after this experimental shipment to Cleveland in 1924, we put the borax process into another of our packing houses, the Walnut Fruit Growers' Association. The operation of the borax treatment actually began in that house sometime in the early part of 1924, the installation was made in the fall of 1923. They went through the entire year without refrigeration and with no decay. Their shipment as I recall was about 112,000 boxes. More than 50 per cent. of their shipments were refrigerated before they used this Brogdite treatment.

The average refrigerating cost, such as for shipping to eastern markets, Chicago and New York is about 19 cents a box. There are 462 boxes in an orange load. I believe it would be 462 at that time in 1924. One time we were running 411. But at that time it would be 462.

Q. 73. How soon after the borax treatment was installed in your Walnut House did you get it into other packing houses in your exchange?

A. The following year because of the remarkable record of the season of 1924 at the Walnut House.

Q. 74. You have not got it in all your houses now?

A. I said all of them. In the following season the Reservoir Street House of the Pomona Fruit Growers Exchange did not install it that year because they did not have time to put in the equipment before the packing season started. They had two packing houses and the West Ontario Citrus Association decided not to use it and they are not using it at this time.

[fol. 38]. The San Antonio Exchange houses that put in the borax treatment after the successful use of the borax at Walnut found that they reduced their decay very materially and we had a little trouble at the Indian Hills Citrus Association the first year we used there in their Navels, but all of them reduced it very materially.

Our season begins in the fall of each year. We reduced the number of cars we had to refrigerate in 1924 and 1925 by about—in other words, we iced that year about 15 per

cent. of our shipment as against the normal refrigeration of about 65 to 70 per cent. Our season begins November 1 of each year and ends October 31, which makes us name two years in a season. We pick and pack practically all the year. Outside of one month, probably, in our district, may be six weeks in the year, we are not packing.

The Walnut House shipped in 1925 without refrigeration. They have shipped for three years now without refrigeration. I cannot recall just off hand what was the amount of their shipments in the 1924-1925 season but it was around 112,000 the year prior. On refreshing my recollection I can say that the total shipments of the San Antonio Exchange for that season were 870,691 boxes, or 2,176 carloads. I see that we experienced during the season of 1924-1925 decay in less than one per cent. of the cars shipped. We made test shipments East, of cars shipped under refrigeration and of cars shipped under ventilation. We have done that for two years now. We found that on direct shipment where we processed the fruit and then shipped one car under ventilation and one car under refrigeration that the fruit under ventilation looked as well and sold as well as the fruit under refrigeration. The shipments were shipped as far as New York. By process I mean using this Brogdite process. We then proved to ourselves that you can ship just as successfully with just [fol. 39] as little decay under ventilation as under refrigeration. All the purchasers do not agree with us. There is a prejudice on the part of the trade that has been built up for years against ventilated cars coming in after others begin to refrigerate, and especially during the warm summer weather, which is the cause really of our not shipping entirely under ventilation all of the processed fruit.

Valencias and Navels are different kinds of oranges grown in the same locality, the Navels of course, in our district come in from January to the first or middle of May and then they are immediately followed by the Valencia shipments the rest of the season. I have spoken of gassing Valencias. Navels are not usually gassed but in certain districts like Tulare, they gas the early Navels to bring out the color.

In our district we have developed more than any one else the pre-cooling of fruit, which is simply a refrigera-

tion by cold air circulated over the fruits. We store the fruit in large rooms and then play the cool air over them. That enables us to store large quantities of fruit and hold the fruit for more favorable markets. That is the reason for our holding fruit at all, to tide over a glutted market or too heavy shipments and regulate our distribution in that way. Before we used the Brogdite, which is the borax process, we held fruit in this way. We could hold the fruit not over twelve days or two weeks commercially. We have held the fruit anywhere from 30 to as high as 67 days commercially, since we have been using the Brogdex Company process, and then shipped without decay. In 1924 and 1925 when our oranges were in condition that we thought ought to come off the trees, we kept in our precoolers and then we shipped the processed shipments up the Coast by steamer to Seattle and Vancouver under ventilation, but the shipment is hard on the fruit under ventila-
[fol. 40] tion, and even after the fruit had been held that length of time we had no complaints. We had never been able to do that to the same extent before we used the Brogdex process. We had shipped by steamer and had suffered some decay by steamer shipments even when we did not hold the fruit.

I have previously said that while in 1924 we got the borax treatment going in all the San Antonio exchange houses, with reference to the Reservoir Street house and the other house, the Reservoir house subsequently installed the Brogdex treatment the following years and they used it in the season of 1925-1926. They are still using it. The Park Avenue house is another packing house of the same association. They installed the borax treatment in the Park Avenue house in 1924 and 1925. During the season of 1924 to 1925, when that Park Avenue house was using the Brogdite treatment, and the Reservoir house was not, the Park Avenue house practically eliminated refrigeration, and went through the season without any decay; while the Reservoir Street house, the refrigerated fruit, quite a percentage, as I recall, about 70 per cent. of their fruit, did not have as good a decay record as the Park Avenue house, which was the reason for the subsequent installation in the Reservoir Street house. When I say that the Park Ave-

nue house went through the season without any decay, I do not mean that literally we got the fruit through without any decay at all. I mean commercial decay, which would be to three per cent. When there is less than three per cent. we call it practically sound. It sells in practically every case.

In the season of 1925-1926, when both the Park Avenue house and the Reservoir Street house were using the Brogdite Brogdex system, the record of decay of the Reservoir Street house was better than the Park Avenue house, and we were interested in that direct comparison, because the fruit was being picked by the same picking gangs in both [fol. 41] houses, and packed under the same management, so that it was the best comparison we have, and we made up a better record for the Reservoir Street house that year, because it draws its fruit from the eastern section of our district where the fruit is a little hardier than the western section, which would show that under the treatment the weaker fruit in 1924-1925 was benefited to the extent that it showed a better result than the hardier fruit, and then when the borax treatment was put into the Reservoir Street house, the normal condition of less decay at the Reservoir Street house prevailed again. I mean by "weak fruit," a fruit that would be inclined to mature earlier than the fruit from the eastern section of our district where the soil conditions are different. That is not the ordinary meaning of the term "weak" because you can use weak fruit or poorly handled fruit, for some condition that applied in mechanical handling; but I was speaking of weaker fruit in this connection from soil or climatic conditions.

The extent to which a certain percentage of decay in a car of fruit affects the amount obtained from the fruit depends on the market. If you have a strong market, we would allow possibly less than 5 per cent., and say 3 per cent. was commercially sound, and allow the excess over 3 per cent., but on a declining market, or a glutted market, we would, I take it, allow the 5 per cent., but possibly more, in order to sell the car. I should say our discount would be fully 5 per cent., and possibly more on the average. We have made gains this past year from 25 cents to a dollar a box on the market through our ability to hold fruit longer in the pre-cooler, due to the borax.

So far I have been talking more particularly about oranges. Our exchange has had experience with the treatment of lemons by this Brogdex Company process. At our lemon house we asked the Brogdex Company to make an [fol. 42] installation there in the season 1924-1925, and have treated the fruit in that house from that time on. Lemons are handled somewhat differently from oranges. They are picked all the time, every month of the year, but we store lemons; that is, store them without refrigeration as used in oranges to cure them. Lemons are picked hard and green, if we can get them in that stage, while oranges are picked ripe. These hardened green lemons are stored in the basement in some place and allowed to cure. We will hold them sometimes over two months; that is, two months; it may be two and a half months in extreme cases. In this period, during this curing process, some decay goes on. By using the Brogdex-borax process we have reduced our storage decay very materially, bringing it down to practically nothing. The decay that gets on lemons is a blue and green mold decay. We call blue and green mold all the same thing commercialy. There are other forms of decay, but that is the most common. Before we store our lemons for two months' curing we treat them with the borax solution. We do not treat them with paraffin.

We have always shipped to foreign countries, but we have been able to ship more successfully under the borax treatment than before, and the requests come in for fruit treated with borax; that is, regardless of whether it is treated with the Brogdite or the Government formula. Fruit treated by the "Government formula" is called by the Exchange "borated"; that is the term we apply to fruit treated under that process, and it is the same practically as the Brogdite. Various associations or exchanges that are a part of the California Fruit Growers Exchange use this borax treatment, so-called. Our San Antonio Exchange is the only one of the district exchange of the Fruit Growers Exchange that uses the Brogdite process under license outside of one other house that I understand is licensed.

[fol. 43] Q. 138. And of all the other exchanges and associations, the California Fruit Growers Exchange uses this borated stuff, or this borax?

A. Not under license—all that use borax, yes.

Q. 139. And how many use borax?

A. I could not say in numbers, but the majority use the borated treatment.

We were familiar with the work done by Mr. Powell and other experts of the United States Department of Agriculture, in trying to eliminate blue mold decay losses. We were very much interested at the time he was making those tests. I knew Mr. Powell. Those were handling and shipping tests which would demonstrate to us the necessity for careful handling in comparison with rough and careless handling.

One of the publications which was put in evidence this morning contains an article by R. L. Willits, of Corona. I have known him since 1916. In 1916 he was connected with the A. F. Call Estate Packing House. He is still connected with that house as manager, and he has been the manager of that house since 1913, as I understand. He is one of my co-directors in the California Fruit Growers Exchange. There was a so-called Borax Committee appointed by the California Fruit Growers Exchange. Mr. Willits was chairman of that committee. Mr. E. G. Dezell is the general manager of the California Fruit Growers Exchange and he was in 1924.

The function of the California Fruit Growers' Exchange is to attend to the marketing and to assist the various packers and growers in the best way of handling fruit, by way of giving information to them. It does everything of that kind, even to advising them as to what methods to use in controlling insects, or in the handling of fruit, anything of that kind that affects the industry as a whole. The way that is done by the California Fruit Growers Exchange is by [fol. 44] circularizing all the associations, and by keeping them constantly informed of everything. (Witness is handed a paper.) This is a circular addressed to all shippers by Mr. Dezell on the borax treatment, control of blue mold decay by the borax treatment. We received this circular and it is the kind of thing that comes to our exchange house regularly. The information that was in this circular came to us and to others in this California Fruit Grow-

ers Association at that time, and was generally disseminated to every shipper. (Circular offered and received in evidence and marked "Plaintiff's Exhibit No. 60.")

Cross-examination:

I found out about the decay in our fruit by the inspection reports from our agents. Our inspectors are in the East, or wherever the markets are, and they report back to us the percentage of decay. They would report 1 per cent. or even the decayed orange in the box that they inspect. They do not inspect all the oranges. They simply inspect say from six to ten boxes in a car from different parts of the car, more if the car shows decay, and less if the car is sound, on inspection of a few boxes.

The Brogdite is the borax treatment. The Brogdex we consider the application of the paraffin to the fruit after it has gone through the other process. The Brogdex treatment was put out first. The Brogdex treatment was simply the paraffin coating on the fruit, the one application or the one process. We first became interested in the Brogdex treatment in the fall of 1921. We had our association directors and managers look into that Brogdex treatment.

I did not say that a number of our association people had invested in the Brogdex Company. We had advanced money to Mr. Brogden, I think then it was the Brogden, Haworth & Ricketts Company. We advanced on machinery [fol. 45] installations, because, as we understood it then, they were in need of funds to make that development, and we were willing to go that far in helping develop what we thought then was an experimental process, but no investment at all of any kind. I am not a stockholder in the plaintiff company here.

Claims were made for this Brogdex treatment when it was first put out, before the Brogdite was added, that it would stop blue mold decay.

X Q. 170. Very extravagant claims were made for the benefit of this Brogdex treatment, were there not?

A. Well, you might call them extravagant claims, but I think at that time Mr. Brogden had the idea the Brogdex treatment would eliminate refrigeration or the necessity for it. Some people call that "extravagant."

X Q. 171. It was claimed it would eliminate decay, just like you now claim the Brogdite eliminates decay, was it not?

A. Yes.

But the Brogdex treatment was not successful in eliminating decay. As I say, we would have success, or what we thought was success, over a period, and then run into very heavy decay. We were then trying to ship certain lots under ventilation, but the Brogdex could not do it alone.

No representation was made to us as to what it was as far as the ingredients. It was simply understood by us that it was a paraffin application. I do not remember that it was claimed that the Brogdex treatment alone was a combination of thirteen chemicals and materials. There was some oil in it, as we understood, to dissolve the wax, but that is all that we knew, so far as the ingredients were concerned. The original promoter of the Brogdex treatment was Brogden, Ricketts & Haworth. They formed the company we dealt with originally.

[fol. 46] My attention is called to a circular issued apparently by that company. I do not remember this circular. I think that possibly it was gotten out in Florida, from the letterhead. I see it mentions a small paper box method of distributing the fruit. I never saw a scheme of that kind. I do not recall this circular at all. This circular enumerates some ten advantages, and states the combination of thirteen chemicals and materials designed for the following purposes. I will state which of those ten purposes were represented to me to be served by the Brogdex treatment.

The first advantage was stated in different language, that is, as to the freshness and flavor of the fruit, and the second in other language, that is, to deliver fruit to the consumer in just as firm and solid condition as it comes off the tree, to eliminate the necessity for pre-cooling—and may I explain there, in our discussion with Mr. Brogden, that we always thought that there would be necessity for pre-cooling or refrigeration, but they are the same thing but under different methods at certain times of the year. We never in our own minds believed that it could do away entirely with refrigeration; and I state that simply to show you that we had discussed these things with Mr. Brogden, and so far as we were concerned, using it as we did, there was

never any extravagant claims made, but simply the discussions as to what the process could do, and we then gave our opinion as to what we thought could be done if it worked out as he thought, to eliminate the necessity for icing and refrigeration, and the use of cold storage at the receiving end; "increase the keeping facilities so as to do away with the necessity of keeping fruit in temporary market conditions;" and that is true owing to the present development, to enable dealers to handle citrus fruits who did not handle them because of cold storage. He made such a statement; and "to enable the small paper box method to be used to [fol. 47] distribute through to the consumer in chain stores." I never heard that statement. It further says—"to increase the polish and cleanliness, making the fruit more attractive." That would be the natural consequences; "to do away with the necessity of having fruit with excessive bulge, and the attendant damage to the fruit, resulting from the crushing force applied to the box." A similar claim was made and that is true under the wax treatment. A box of Brogdexed fruit leaving the packing house should reach the market with more bulge and be a fuller box than un-Brogdexed fruit leaving a packing house with twice the bulge. That might be an exaggeration, but that claim has been proven out to some extent, thus increasing the volume of the number of boxes. This applies to Florida fruit to be sent by ordinary ventilated tramp steamers to domestic and European ports. That claim was never made to us, but we have done it, not with the Brogdex alone but under the present treatment. I would not call those extravagant claims, if they were made with the knowledge on the part of the shipper, that it was an experiment, as we understood the whole thing was.

These claims as facts were not justified by the Brogdex treatment alone. I do not remember that it was claimed for the Brogdex alone, that it made an air-tight covering on the fruit, and in that way prevented decay. I do remember talking to the Pathologist at the Riverside Experiment Station as to that, and he claimed any sealing of the fruit entirely would be unsound, because of the necessity for freeing the gases. I remember that in our experiments where we treated the fruit with the wax by hand we got too heavy a coating and that the fruit went down. By

"went down" I mean decayed, rotted there inside, spoiled in its flavor. Our managers all knew from the start that too heavy an application, or a sealing entirely of the fruit [fol. 48] cells or pores would injure the fruit. We understood that condition to apply. I understood the Brogdex treatment to be a sealing of the fruit, but not an entire sealing of the fruit. Mr. Brogden, as I recall, claimed it breathed through the stem. He always claimed it had a method of breathing or living. I cannot say what his idea was.

We have nine packing houses in our district. In my direct examination I described the Brogdite process as installed in one of our houses. The Brogdite treatment is applied in that house in the following manner: We have a large soaking tank filled with water in which is placed this borax, and the fruit is submerged in that, and then is carried on a conveyor to the brushes, that is a roller conveyor, elevator, rather, two-cylinder brushes where it is scrubbed on those brushes with the spray, with the borax solution on it, and then from that it is lowered with what they call a bull wheel to another immersion or bath of borax where it is the same as the water in the soaking tank, and is then from that taken on a belt or one tier as you might call it, and pure water is sprayed on it, to rinse off the excess borax, and from that it is carried to the driers and through the regular packing house machinery, until it gets to the wax application, which in turn is sprayed on from atomizers and run over brushes, to clean the fruit and get the excess wax off.

The Brogdite process does not include the paraffin. There are two steps. The Brogdex which includes paraffin alone came out first. In describing the Brogdite process alone I should have stopped on the borax. We still use the Brogdex treatment. We use both the borax and the Brogdex, which would be the application of paraffin to the fruit. We call the Brogdex system the combined treatment sometimes.

I understand that in Florida paraffin has been applied to fruit for a long time for such purposes as polishing the [fol. 49] fruit. I had never known the use of paraffin as an actual commercial process in California. I suppose the Parker Polisher did originate in California, if it was named Parker, because he is a machinery man.

The figures which I gave as to the decay estimates, were not taken from machine decay records of our houses. We kept as close tab as we could on our decay records, because we were in those years experimenting, and trying to satisfy ourselves that we had got a benefit from these processes, so that in that statement I made, I suppose you refer to the statement as to our houses, which was an actual record. The loss for the year on decay would have to be an estimate taken from the records, but that is impossible to arrive at unless you take each particular car, or arrive at it accurately, but it would be a conservative estimate. The percentages of the case which I gave were taken from the records. Our loss resulting therefrom was simply my estimate but that estimate was based on the losses from actual records.

The West Ontario Citrus Association of Narod, one of the houses in our exchange, did not use the Brogdex system. Their figures or decay last year would show a greater percentage of cars decayed than, I would say, practically all our other houses; but I couldn't give you that. In going over the decay record I understand that is—whether I have that with me or not, the decay records of the California Fruit Growers' Exchange—that decay record would show they have had a higher percentage of cars showing decay than most of our other houses. That is from the actual records, but I could not give you the percentage.

I can not give off hand the record for decay for 1924-1925 for the California Exchange; 1924-1925 was the frost year. The California Exchange keeps its record on percentage [fol. 50] of cars that show decay, not on the percentage of actual decay. The figure we have is the percentage of cars which show any decay regardless of amount. I think I have this figure for the seasons of 1924-1925 and 1925-1926. (The witness is asked to get those figures.) The season, as I explained, is from November 1st to October 31st, and we call that season of 1925-1926, including the two years but one season. In 1925-1926 the season was over November 31st.

Pre-cooling is the process we use in California in refrigerating fruit by the circulation of cold air over the fruit; what we call a dry air circulation, and that air is brought down to the temperature we want the room or the fruit

brought down to. That practice is not mer for the purpose of storage but we pre-cool before shippin Originally it was a combination of refrigeration plus storage, but not for holding purposes. We felt it was better refrigeration. When we pre-cool the fruit, which is done before the fruit is loaded in the car, in addition we ice the car prior to loading the fruit into the car. We do not ice in transit, that is, unless the car has been held out an unusual length of time. We place the ice in solid blocks in the car and then that car is supposed to go through to destination without ever touching it, because the fruit is brought down to say 32 or 34 degrees and acts as refrigeration. The purpose of pre-cooling is primarily to get better refrigeration. We take the boxes as a unit instead of the car and getting it under refrigeration that much quicker. You see the minute a box is packed, it goes down by a conveyor into the pre-cooling room where it is immediately under refrigeration; but primarily we took it for better refrigeration. There is no question about its effectiveness for that purpose.

[fol. 51] XQ. 221. Do you use pre-cooling refrigeration merely to check decay or is it used also to preserve the freshness of the fruit?

A. For both.

XQ. 222. And even if the fruit did not decay, you would want to cool it or refrigerate it to keep it fresh until it reached the market, is that right?

A. Yes, that is true, except as I stated that experiments we have made—and may I answer that so you will understand it. That is, go into this part of it?

XQ. 223. I hope so.

A. The experiments that we have made have convinced us that with the wax treatment we can do away with at least a great part of our refrigeration, because it does preserve the freshness of the fruit; but you understand under certain market conditions and under certain maturity conditions and with the trade prejudiced against the ventilated cars, because of the fact that they had been refrigerated for years, that we can not afford to take a large block of fruit and go against the prejudice or go against certain market conditions and not refrigerate. But where fruit is

sold quickly and shipped direct to certain markets, like California to New York, we can go just as well under ventilation. I am convinced of that.

When we ship under ventilation, we do not chill the car before it starts. You see, if we put our fruit into the pre-cooler and hold it there any length of time, we would prefer to refrigerate because of the fact that we have found that there is a certain weakening effect to that refrigeration, and yet under the pre-cooling, with this dry air circulation, as against storage, there is not the deterioration in that fruit as there would be under certain other conditions, as there would be in refrigeration, so that we have gone as long as sixty-seven days in the pre-cooler and then shipped the fruit under ventilation East with no bad results at all. [fol. 52] And in that case we chill the fruit but that is simply an exception. If we shipped under ventilation, normally we would take it right off the floor and ship it in the car.

The method of shipment depends upon the maturity of the fruit. We ventilate the cars now when the eastern territory is down to zero. If our Navels are matured the first of March we would start to refrigerate. We would not treat the fruit. It is not then a case of weather conditions but a case of the maturity of the fruit; but in the greater part of the season, of course, the weather is warm in the East and we have to refrigerate on that account. Remembering that the temperature in California is much warmer even than the eastern temperature, crossing the desert, so that we have to take into consideration the temperature there as well as here. We have to consider the temperature the whole length of the journey and the maturity of the fruit in determining how we are going to ship.

I think I have read Dr. Powell's bulletin, No. 123, on careful handling. It was one of the bulletins introduced by plaintiff's counsel this morning. I could not identify it, but I am sure I have read every bulletin of Dr. Powell's issued in California. I can not recall just what it says, but I would say that I have read every bulletin of Mr. Powell's because that is a part of our work, to keep up on those things. Dr. Powell's writings on this subject are considered authentic and truthfully represent the conditions that

he purports to describe. We considered him as an expert on that line from his training so that where he describes existing conditions in California I would concede that that was a correct description.

I first heard that the Brogdex process consisted of a borax treatment, I believe, some time in 1924. It was in the fall of 1923 that we used it. It was used then just in the [fol. 53] name of Brogdex. No disclosure was made of what it consisted of, that is, not to my knowledge, not to my recollection, anyway.

When we hold fruit in storage, that is, cold storage, in our pre-coolers, we call them, there is a refrigerant used all the time for circulating cool air over the fruit. The air is circulated over ammonia pipes, and over the fruit. It is a method of cold storage.

I have seen the patent in suit but I do not know when it was issued. (He is told by counsel that it was issued on March 10, 1925.) I first learned that the Brogdite treatment consisted in dipping the fruit in borax before that date but I could not say whether I heard it from the Brogdite people or from our own people. They were making tests then of the solution, or an analysis of the solution, so that we knew pretty well what was in it. I would say that from the Exchange's or from our association men, not from my own tests or analysis.

Redirect examination:

I spoke of advancing money to Mr. Brogden in connection with the Brogdite system. We got that money back when the machinery was installed in the houses. I think a refund or that allowance of that installation was made by the Brogdex. I have no financial interest of any kind in the plaintiff company. We have no interest in the outcome of this suit except that we have felt right along that the dscovery was of such importance to the industry that the ones who developed it were entitled to consideration. That is the feeling of our board of directors. I came East for the purpose of testifying in this case. I am being paid my expenses; my travelling expenses and nothing else. Our directors were willing that we should come East to testify for the reason I have already stated.

[fol. 54] JAMES WOLSTENCROFT

JAMES WOLSTENCROFT, of Walnut, California, called as a witness on behalf of the plaintiff, and having been first duly sworn, testified as follows:

Direct examination:

I am secretary and manager of the Walnut Fruit Growers Association which is a part of the San Antonio Fruit Exchange. I have had about twenty-one years' experience in the citrus fruit industry. I commenced as a laborer in the houses in 1905, with the Park Avenue house, Pomona. Later, I was made foreman of the Indian Hill Packing House at North Pomona and I was foreman of the Zanta Packing House, and I came back and was made foreman of the Pomona House and I have been with the Walnut Fruit Growers Association, secretary and manager, since 1915. The average yearly shipments of the Walnut Fruit Association up to date is about 300 cars. This year we expect to ship about 450. There are about 400 boxes to a car. We do not handle lemons; we handle oranges and grapefruit. Most of the shipments are oranges.

During my experience in the fruit business, I have kept in close touch with the developments of the industry and the various methods of treating fruit used by other houses for that is part of my business. We have always had to contend with blue mold decay.

I have come in contact with G. Harold Powell. When I was working at the Pomona Packing House Mr. Powell came to make his experiments on fruit and I was assigned to help him with the fruit. When I say "help him," I mean I was just a laborer in the house and I had to get fruit for him and help him stack it and such-like. He was connected at that time with the Department of Agriculture. I saw him in subsequent years. After that he was general man-
[fol. 55] ager of the California Fruit Growers Exchange. I knew him till he died a few years ago. I have read Mr. Powell's reports which are published in the Government's Bulletin No. 123, which Mr. Morton, counsel for defendant, referred to. We read all those reports, that came to us in the matter of business and were brought to us; we would read them. Mr. Powell in that bulletin, and others, recom-

mends for controlling decay careful handling and the use of ice to retard the development of decay. While I was working with Mr. Powell, or during any other time, he did not recommend to me any other means of preventing decay than careful handling and of course refrigeration as an aid to it.

I first heard of the Brogdite process in 1923, in the latter part of the year. I first heard of it from Mr. Brogden in connection with some experiments he was trying at the College Heights Citrus Association. At the Walnut Association they had installed the Brogden treatment, that is, the paraffin treatment, prior to that time. The Brogdite or borax treatment was put in to the Walnut Association in 1923-1924. They commenced installing machinery about the latter part of 1923, and we commenced packing—using the Brogdite and the paraffin system in about the first week in January of 1924. I did not know at that time what was in the solution. I found out, I should imagine, in about two or three months. I know Mr. Brogden told me at the time that if I knew what was in it I would laugh, it was so simple. I found borax was in it.

The strength of borax solution used at the Walnut Association varies. We have a regular schedule that is used by the Brogdex Company and that is put up for the operator to work accordingly by. It is on the percentage, I should say, from six to eight. I would not be exact. It runs about ten pounds to the gallon, I think. The reason for tabulations of any kind is that there are different temperatures of water. The strength solution which we used dur- [fol. 56] ing our use was about six to eight. I would not be exact; it is somewhere around that.

I will describe just now, without going into the minutest details, but just generally, how this borax solution is used at the Walnut Association. The borax comes in sacks to the packing house furnished by the Brogdex people and our operator takes that and puts it in—we have a large soaking or dumping tank probably about eighteen to twenty feet long, and he mixes this borax in the water until he gets the required solution, then the oranges are dumped into that and there is a great big long submerger—paddles that come over and they take all the oranges underneath so that there is no question but what every orange is sub-

merged. From there they go to the washer where they are sprayed by the same solution. They come back under the washer in the same solution again. From there they go under a spray of clear water; from there they go into the drier. The drier goes the length of the packing house. It comes back and from there they go into the Brogdexer, which is the paraffin, that we put on, and from there they go to the graders.

When we first began to use this borax, we made quite a lot of tests of the treatment. They consisted of tests of fruit injured, fruit not injured, fruit inoculated for blue mold. I might say that those tests were all put up by and under the supervision of the field department of the California Fruit Growers' Exchange; Mr. Ramsey and Mr. Nelson—Mr. Nelson particularly conducted the experiments. I was present during the conducting of these experiments and took part in them. They were conducted at the Walnut Packing House. Mr. Nelson was in charge of the experiments and we gave him all the assistance possible. Mr. Barger came in during a time; he was there some of the time. We had a tremendous amount of people there at the time. These experiments were conducted in Janu- [fol. 57] ary and February, 1924. The Field Department kept records of these tests. (Witness shown a report.) This is a record of those tests I was speaking of. These are particularly relating to the Walnut Packing House, those headed, "Tests 9 to 12," samples from the Walnut House. These tests go on to the other numbered tests also. The other tests referred to in this report I am familiar with also; the tests of the other houses, Redlands, Gold Buckle Association. They were also made by our house from fruit gotten from those other houses and made in conjunction with our own fruit. I think in the report it gives some Tulare County tests. Of course, we were not familiar with those. Those were conducted up in Tulare County. All we got were the reports from the Field Department. (The report is offered and received in evidence and marked "Plaintiff's Exhibit No. 61.") With reference to these tests of which I have been speaking, there were some of the Brogdex people there at that time, that is, from the Brogdex Company in California. When I speak of the

Brogdex Company I mean the officials of the Brogdex Company. Mr. Brogden himself was present at these tests, Mr. Barke was there, and the president of the company was in once or twice, Mr. Wallace. There were quite a few of them. There was nothing kept secret as to the materials being used. We had all kinds of people come in. As a matter of fact, we had some people take away a sample of the powder that Mr. Brogden put into the water to test it; Mr. Willits, of Corona, was one of them.

We get the reports from the California Exchange that show the shipments, the arrivals and the condition and the sales of the fruit, which give us a thorough understanding of the general condition of the fruit throughout the country. These reports are sent to us every day. Every packing house manager gets them, every shipper gets them. There is quite a difference in these reports. From certain [fol. 58] districts fruit is weaker; there may be heavier soil; we may have had quite a little of rain, foggy conditions will weaken the fruit and naturally will cause more decay.

Prior to using the borax treatment at the Walnut House probably 80 to 90 per cent, I would imagine, of our fruit would go under refrigeration. Since the Brogdite system has been used we haven't used a pound of ice. 1924-25 was the first year we put the process in and we shipped under standard ventilation and have been ever since.

We have found the carrying qualities of the fruit under standard ventilation to be very satisfactory. Our decay for the first year was about half of one per cent.; the second year about two-fifths of one per cent., and last year one per cent. Now, when I speak of that, if I may explain that, Mr. Neave, when I say "per cent.," we get a report from our inspectors in the East and they specify on that report how many boxes of oranges they have examined and whether they found any decayed and they specify the number of oranges decayed, and these figures that I am giving you are the summary—the total of the amounts of oranges that they examined, with the amount of decay they found in those boxes. That is the average for the season. This percentage is not the percentage of the cars shipped that showed the decay, but the percentage of the oranges exam-

ined that showed decay. So, if I say one per cent., I mean of the oranges examined they found one orange out of one hundred that showed decay.

A fair estimate of refrigerating costs in shipping from California to New York is $80 to $90 a car. Where our shipments of fruit show, for instance, 5 per cent decay, there are losses other than the loss of that amount of fruit from decay. There is a financial loss. The financial loss amounts sometimes to a good deal more than 5 per cent. of the value of a sound car, particularly if the market is weak. [fol. 59] There are other savings effected through the use of the Brogdite treatment as we have used it; there are quite a few, both definite and indefinite. For instance, there is an actual saving on ice in a car which would probably amount in our case to $60 to $70 a car. That is after paying for the cost of the process and outfit. Then, of course, there are other savings. We are enabled to pack fruit because we have been satisfied by our experience that it will hold and give satisfaction to the trade that otherwise it would have been impossible to put in our grade—that we would not have tried to put in our grade. We can now pack fruit that shows some abrasions on the surface, fruit which otherwise we would have had to instruct our graders to throw out. We would not have dared to go to market with it because we would have been practically sure of decay. Then, again, we do not have to put quite as much fruit in the box as we used to. We do not have to pack it quite as high because of the use of the paraffin process with the borax treatment prevents the fruit from shrinking and we can pack it firm at the packing house and it will come to the market in that condition. Whereas, if it had not the paraffin process on it would show some shrinkage. We probably gain two or three pounds of fruit to a box that way. Then, of course, we have our machinery and all that *that* is taken care of by the company.

The following colloquy took place:

The Court: You mean, Mr. Neave, that you do not rely upon that two or three pounds of fruit saved resulting from the paraffin process?

Mr. Neave: No.

The Court: You are not relying upon that at all?
Mr. Neave: No.

[fol. 60] Leaving out the paraffin, I think that from $150 to $180 a car would be a conservative estimate of our savings due to the use of the borax treatment per car of packed fruit, taking into account the saving of shipping under ventilation and the decreased percentage of culls and decreased decay and so forth. Since we started this borax treatment we have extended our markets. We were enabled to go into markets and hold our trade where formerly we could not. For instance, we now ship as far south as New Orleans, as far north as Vancouver and Seattle, as far east as Montreal, and we ship all that without refrigeration; goes ventilated. And, not only that, but we have worked up a trade there for our brands which before we did not have. I do not mean by that that our brands or our fruit is any better than anybody's else, but the fruit does not decay and naturally they call for it. What they want is sound fruit; fruit that will keep and that has been a big advantage to us in our individual packing house.

We have a source of knowledge as to the percentage of the citrus fruit in California that is being treated by the borax process. We get the size list of the California Fruit Growers Exchange every day and that list is marked "Brogdex" or "borated" or whatever—Slaterized, I think it was. That is a process that has gone out, and also, of course, I have knowledge from my individual experience in visiting packing houses that I knew were using the borax process. Visiting other houses is quite generally done. It is quite common amongst the managers to go from one house to another to see what we could find. The percentage of citrus fruit in California that is being treated by a borax process, either by the Brogdite process or other fruit that is borated, is quite heavy, I would say. I would imagine almost 80 or 90 per cent. now. There are other houses that are using that same process that it does not show on the size list; I mean, that are using the borax. I [fol. 61] know that because I have been in them. I had not, before I heard of the Brogdite process, ever known or heard of anybody using borax in connection with fruit. We all, more or less, would use Gold Dust and washing

powder and stuff like that. If I had to choose between refrigeration and the borax treatment, I would want the borax treatment undoubtedly.

As a member of the California Fruit Growers Exchange, our association was entitled to help from its organization. The California Fruit Growers Exchange have a field department that come around, well, every day; sometimes twice a day, they inspected us and inspected the grade and the pack and the fruit and carried ideas from one packing house to another and they help and assist all of those members to see if we can improve our methods in any way. Mr. Ramsey is head of the field department now.

I have no financial interest or other interest in the Brogdex Company or in the subject matter of this suit. It does not make any difference to me at all financially which way this suit turns out, but morally we think that when people work like that the ought to have their—I think they are entitled to anything developed; they ought to get the benefit of it; at least that is the opinion of all our people. I came here just to testify in this suit by order of my board of directors. All I am getting out of it is my traveling expenses. I might say that my association, the board of directors are paying my salary while I am here.

Our house was the first one that shipped fruit under ventilation instead of refrigeration to any large extent commercially. We did meet with some opposition on the part of purchasers or other people. There was and is undoubtedly from the trade some comeback on it. We found that out in several cases—something new, the trade were not accustomed to see fruit come in in summer, or even in the [fol. 62] latter part of the Navel season, without ice. It was natural that they should have that discussed, but I think they practically got over that.

As to the introduction of the borax treatment in the Walnut Packing House—we tried the Brogdex treatment, i. e., the paraffin treatment, in 1923, and it was not the success that we hoped. And then we found out that Mr. Brogden was conducting tests up in Tulare County with the Brogdite process which he had tried at the College Heights House, and that he was making these tests under the direction of the Field Department of the California Fruit Growers Exchange, and of course, we were very intensely in-

terested in them and we talked over the matter with them and the results of the tests were so favorable that we felt we owed it to the industry to try it out. It looked as though it might be a very good thing for us.

Cross-examination:

I cannot say that the opinion I just expressed as to our preferences in the outcome of this case reflects the opinion of the California Fruit Growers Exchange generally. I was speaking for myself. I might explain that I, personally, was criticized quite a little for going ahead with this process, taking this chance as it might be, because we were not absolutely sure that the thing would prove successful commercially, but it did and as it is now we get some talk back from the growers of these other fruits that they are using the borax and not paying for it and we are, so there may be a little natural preference. I can only speak for myself and not for the board of directors. The board of directors of my association are very favorably impressed with the process, which they are bound to be by the results they have obtained. I have not had any expression of opin- [fol. 63] ion from the directors of the California Exchange as to their preference in this suit. I do not know what they think about it.

I estimated that 80 to 90 per cent. of the fruit from California was treated with borax. We arrive at that figure by the shipping lists of the California Fruit Growers Exchange which are marked "borated" where they are using the borax and there is a tremendous majority there. We know some of our other organizations are using it, and of course all the San Antonio Exchange is using it. Another organization is using it through all their packing houses and there are houses that are not marked that are using it. My figure was taken from the reports from the California Fruit Growers Exchange, plus such knowledge as I may personally have of individual houses that I have been in that are not on the list. I would imagine undoubtedly that the greater part of this 90 per cent. is made up by the houses on the list. I understand that all the houses of the

San Antonio Fruit Exchange except the West Ontario, are licensees of the Brogdex Company.

I have referred to another treatment that I called Slaterized. I can not tell much about it. It was a treatment that was tried out by the Charter Oak Association; some kind of a salt treatment, but I understand it was not successful. The greatest benefit of it that I heard was the fact that it kept the people in this packing house free from colds. I do not know that this process is used anywhere now. I do not know whether there is any borax in that treatment. I do not know much about it.

The per cent. of fruit which we throw out as culls depends a great deal on the season. That will vary. Our average last year had about 4 per cent. It depends a great deal—if you get a year where there is a good deal of rain or there is good deal of wind, naturally, you get more culls. [fol. 64] I say that last year it was about 4 per cent., that is just offhand. Those are culls which we did not market. We keep an absolute record of the culls.

Last year was a fair year in our district, with regard to the injury to the fruit, perhaps not quite fair because we had a little more wind than in some districts. I would say it was not quite a fair year; because we had quite a windstorm. It was not what I would call an extraordinarily bad year. I cannot say offhand whether 1924-1925 was better or worse than last year. I know this much, that our cullage has been 3 or 4 per cent. less since we used the borax treatment than it was before. I am referring to the entire year, comparing a year where we did not use the borax with one in which we did.

Different weather conditions would not necessarily make quite that much difference in the amount of our culls. The difference in the culls that I wanted to bring to you was that we were enabled to pack more fruit than otherwise we would have been able to if we did not have the borax treatment. This difference resides both in the decrease in the amount of culls we throw away and in that some fruit that we otherwise would throw away with some particular kind of an injury on it we now pack.

We do not use pre-cooling at all.

The figures I gave as to decay were taken from our records. I have looked at the figures sufficiently recently to

have them pretty well in mind. I have the exact figures for the three years that we have had the Brogdite and Brogdex system. I have not got the figures for any previous years but I can tell you what they were. They were a good deal more than that. Our average decay over a period of six or seven years would run around 5 per cent. The years I have in mind are from 1923 back, 1923, 1922, [fol. 65] 1921 and so forth. I have not got the figures for those individual years. I just have the general average. I cannot recall what our figure was for any one year but I can recall this, that the general average was around 5 per cent. and we had it up and we had it down. I do not particularly recall any one figure that went into that average. We took them together to get the general average. We have been troubled so little with the decay that we have not been taking much notice of it. I have not our actual decay figure for any year prior to 1923 here but I have the actual figures for 1924, 1925 and 1926.

X Q. 136. You estimated the saving on the car of fruit as about $150?

A. Yes, sir.

X Q. 137. Can you give me the items that you used in making up that sum?

A. We figured approximately $70 on refrigeration alone. We can figure three or four pounds of fruit to a box. We can figure the extra amount of fruit that we can pack which otherwise we would not be able to. There is also the machinery which is supplied in the cost of the process which we did not have to pay for, for instance for brushes alone, we would change our brushes four times a year and we would have to pay $250 each time we changed our brushes. We do not have to do that at all. We have our soaking tank and washer put in place. I may say that we have no allowance practically to make for decay but it would bring it up to that figure. You have over half of it on the refrigeration alone.

X Q. 138. The refrigeration alone is the only item that you have any accurate figure on?

A. Of course, the rest is estimate.

X Q. 139. Is mere estimate?

A. It is an estimate and we know it is there.

[fol. 66] Redirect examination:

In answer to a previous question I am told that I said we used ten pounds of borax to a gallon of water. Ten ounces is what I should have said.

In making up my estimate of $150 I included the saving of three or four pounds on each box. The saving of two or three pounds a box is due to the combination of both processes, but primarily to the paraffin treatment. The paraffin treatment would not, in itself, be effective if we did not use the borax. We could not have shipped under ventilation without the combination of the two processes. The amount of my estimate with respect to the saving of two or three pounds a box was between $25 to $30. It depends on the price of the fruit.

Recross-examination:

The figures I have just given are the saving per car.

Reginald L. Knox

Reginald L. Knox, recalled, testified as follows:

Cross-Examination By Mr. Morton (resumed)

I have been asked our figures on decay for the season of 1924-25, i. e., the average or per cent of cars showing decay of the California Fruit Growers Exchange shipments. I have simply a copy of that record which shows 6.4 per cent of the cars shipped that show decay. That is the basis on which the record is kept. That is all oranges. That does not give the per cent. of decay but the percentage of cars that showed decay without regard to the amount of decay in each car. I have not got the corresponding figure for 1925-26; that is up at the hotel. We could not get it at this [fol. 67] time, but I verified it. It is eleven and a fraction per cent. We can give that to you and verify it later on. The first figure for 1924-1925 was 6.4 per cent. I know how many of the houses of the California Exchange were using Brogdex and Brogdite, I mean the whole process, in 1924-25. That would be the year we all put it in at the San

Antonio Exchange with the exception of the Reservoir Street house. In 1924-25, the Azusa house was the only house of the whole California Exchange, other than those of our own district exchange (San Antonio), that was using the complete Brogdite-Brogdex process. In 1925-26, we simply added the Reservoir Street house of our district exchange, while the same outside shippers of the California Exchange continued to use borax. No other houses of the California Exchange were using the Brogdite process under that name in 1926. Today our (San Antonio) houses with the exception of West Ontario, and this Azusa Orange Company, are the only California Exchange houses using the complete Brogdite-Brogdex process; but there are other houses of the California Fruit Growers Exchange that are using borax. Other houses of the California Exchange were also using borax in 1924-25, besides those I have mentioned as using it under the name of Brogdite, but not to the same extent as now.

The following colloquy took place:

Mr. Neave: Mr. Morton, you previously asked him about those bulletins, No. 123. Will you show him the part that you referred to because he should know just what part he is endorsing.

Mr. Morton: No particular part except the bulletin purports to describe the condition that Mr. Powell found when he went out there and what ought to be done in the way of improving those conditions.

[fol. 68] Mr. Neave: And your question was whether he particularly studied the condition.

Mr. Morton: Yes, whether his description of the condition when he found this high percentage of decay was a correct statement of the conditions prevailing at that time. If there is any part of it that the witness does not want to endorse he may look it over and if there is anything that he wishes to take exception to, he can say so.

While the next witness is testifinyg, I will look over this report.

When I gave Mr. Morton the figures of 6 per cent. and 11 per cent., that was a percentage with reference to all of the houses of the California Fruit Growers Exchange. It includes the houses that used the Brogdite process under

license from the Brogdex Company and also those that used the borated processes and those using no process if there were any such.

About 65 or 66 per cent of the oranges from California are packed by Exchange houses as distinguished from the independent. We have about 71 or 72 per cent of the total packed but in oranges about 65 to 66 per cent. I refer to the California Fruit Growers Exchange.

FRED C. JACOBS

FRED C. JACOBS, of Pomona, Cal., called as a witness on behalf of the plaintiff, being first duly sworn, testified as follows:

Direct examination:

I am secretary and manager of the Claremont Citrus Association of Claremont, California. This association is a member of the San Antonio Fruit Exchange. I have been [fol. 69] manager of that association a little over eight years. I had previous experience in the citrus industry. In 1912 I was bookkeeper at the Pomona Fruit Growers Association at Pomona and afterwards assistant manager and I took my present position in 1919, and I have held it ever since. The San Antonio Exchange is a sub-exchange of the California Fruit Growers Exchange.

The California Fruit Growers Exchange maintains a field department that I come in contact with. This field department is headed by a manager and there are quite a number of inspectors, I do not know how many, perhaps 20 or 30, and their duty is to visit each packing house every day when we are in operation and supervise the pack and give us any advice they can as to improvements in the methods, if there is anything new that comes up that is of benefit and it is passed around to all the packing house managers. (Mr. Neave refers to several articles, in evidence for plaintiff, written by J. H. Ramsey in 1912, 1914, 1915 and 1921.)

I know J. H. Ramsey. He is the Field Manager of the California Fruit Growers Exchange and he was in that

position in 1924. The Field Department in addition to sending inspectors around issues periodically bulletins giving advice to the sub-exchanges and the shippers, and so forth. (Witness is shown bulletins or circulars headed "California Fruit Growers Exchange, Field Department" addressed to all shippers, dated December 20, 1921, December 21, 1921, January 4, 1924, and April 8, 1924.) These are bulletins from the Field Department of the California Fruit Growers Exchange that I as manager received at the time or about the time which they are dated. These are representative of the kind of information and assistance that we get from the California Fruit Growers Exchange, Field Department. Mr. Neave offers these bulletins in evidence.

[fol. 70] (Bulletins received in evidence and marked "Plaintiff's Exhibit No. 62.")

The Fruit Growers Supply Company is an organization that is composed or rather owned by the members of the California Fruit Growers Exchange. It is what you would call a buying organization of the Exchange, that is, they buy our packing material. I can not say definitely how long it has been in existence; more than fifteen years. I do not recall receiving from them prior to 1924, any circulars offering to sell us borax. (Witness is shown a circular of that organization that is dated February 16, 1925.) That is a circular with which I am familiar and which I received at the time. That is the first circular that I can recall having had from them offering borax. (Mr. Neave offers in evidence the circular of the Fruit Growers Supply Company.)

(Circular received in evidence and marked "Plaintiff's Exhibit No. 63.")

Since being manager of the association of which I am now manager, I have been in close touch with the developments in the industry and in close touch with what people around me have been using. Prior to 1923 or 1924 blue mold decay was our big trouble. Prior to those dates, prior to 1923, I did not know of or hear of the use of borax in connection with fresh fruit.

We are just finishing our second season using the borax treatment under the license of the Brogdex Company. The

process consists of dumping oranges into a large tank in which is a mixture of borax; the fruit travels through that onto the brushes where it is again sprinkled with the same water and it then returns to another soaking tank and finally has a light rinse of clear water and after that it goes on the dryer, and after it is thoroughly dried it goes onto the brushes where the paraffin is put on with a kind [fol. 71] of an atomizer. The strength of the borax solution runs about 7 per cent. In 1922-23 out of 508 cars of Navels shipped we had 38 that showed over 3 per cent. decay and that was 7.5 per cent. In 1923-24 out of 412 cars, we had 86 show over 3 per cent. decay which is 20.8 per cent. This was prior to the time when we used the borax treatment. Since we have used the borax treatment our percentages of decay for the two years following were just exactly alike; they were an even 4 per cent., showing decay, that is, showing any commercial decay. The size of our shipments in 1924-25, was 371 cars and in 1925-26, 200. Those are just Navels because Valencias are a small percentage and they are not susceptible to decay and I did not compile the figure on the Valencia.

The figure that I have just given shows a considerable decrease in the percentage of decay since we used the borax treatment. I would say it was a very remarkable decrease in percentage. It is practically cutting it in half, as compared with the 1922-23 season and much more than that on the following season, but there was quite a heavy decay in 1923-24. 20 per cent. was very large. We have made comparative shipments iced and ventilated, to determine how borax-treated fruit would carry under each of these conditions. We have made two or three checks, a car that would be shipped under ventilation, shipped at the same time and to the same market as one shipped under refrigeration and there was no difference, no advantage to be referred to in any shipment. There was no advantage in price.

I came East just to testify in this case. I have no interest in the Brogdex Company, direct or indirect.

Cross-examination:

The California Fruit Growers Exchange is made up of a number of what might be called local exchanges. I under-

[fol. 72] stand there are 22 sub-exchanges and those 22 sub-exchanges are made up approximately of 220 packing houses. My understanding is that only the seven packing houses of the San Antonio Exchange and the one in Azusa are using this Brogdite borax treatment as licensees. I have no knowledge of any others. In 1922-23 and 1923-24, in neither of these seasons did we use any borax treatment. We experimented with the wax treatment, the Brogdex part of the system with a few cars back in 1922, I believe it was, but only in a very small way. We decided to let the other houses do the experimenting and we would watch the result. That did not affect our figures here at all because they were so small. The other houses that are using the borax so far as I know, are not licensees.

As I said before, the only ones that I know of that are licensees are the San Antonio houses and the one in Azusa. I know there are quite a large number of houses using borax but I do not know how many. The formula that they are using is spoken of as Government formula. I have a copy by Dr. Barger, I believe it is of what that formula consists. I do not remember off hand what the percentage is.

HARRY W. PIERCE

HARRY W. PIERCE, of Claremont, Cal., called as a witness on behalf of the plaintiff, testified as follows:

Direct examination:

I am secretary and manager of the College Heights Orange and Lemon Association, which is a member of the San Antonio Fruit Exchange. I have been manager of the College Heights Association for three years. I started in the citrus industry in 1904 and put in one year in the [fol. 73] Pomona house as foreman and then I left the industry and came back to it in 1914 in the fall. I then took a position as Field Manager of a local packing house in LaVerne. I held that until 1919 when I took the field work at the Pomona packing houses and followed that in the fall of 1922 as manager of Indian Hill Citrus Association and followed that in the fall of 1924 in my present position.

The annual pack of the College Heights Association of which I am secretary and manager will be about five hundred cars of oranges and three hundred cars of lemons. Our association uses the borax and paraffin treatment under license from the Brogdex Company. I have heard the last two witnesses testify as to how they used it. We use it in the same way on the oranges and to some extent the same way on the lemons except with the lemons they are not treated at the same time. They are treated with the borax when they are first picked and then we store them and after they are cured and ready to pack then we treat them with the wax. We first used the borax and paraffin treatment commercially in 1925. For the season of 1923-24, 13 per cent. if I remember it, of the cars shipped from our association showed decay. I have the figures here. In 1923 we shipped 641 cars of oranges and 13.3 per cent. of the total cars shipped showed decay, i. e., 99 cars. In the 1923 and 1924 season which extended from November 1923 to October 1924, we shipped 358 cars. Of these, 48 cars or 11.8 per cent. showed decay. None of the fruit in them was treated with borax. In 1924-25—that was the first season we used the borax paraffin treatment. The oranges were practically all shipped in the 1924 year; there were 491 cars shipped and 43 showed decay or 8 per cent. In 1925-26, that is, the fall of 1925 and the year of 1926, out of 344 cars, 25 showed decay or 6.7 per cent.

Prior to 1924 we used no methods in the atempt to control decay excepting to insist on careful handling of the [fol. 74] fruit and then retarding it as much as possible with pre-cooling and icing. An average of 70 to 75 per cent. of the orange output was customarily pre-cooled or refrigerated. In our present practice, the percentage of our fruit which we refrigerate is controlled a good deal by the market and the condition of the fruit as to the desirability of holding the fruit. In 1925 we refrigerated only 9 per cent. of our Navels, while in 1926 we refrigerated more than that owing to the fact that we held them in the pre-cooler to regulate the shipments, and after holding them in the iced condition we did not feel it was desirable to ship them under ventilation. We found that we could hold this fruit as treated by the borax treatment in the pre-cooler for shipment for a period of thirty days as not un-

common at all. I think the longest shipment we had was fifty-four days. Before we used the borax treatment we did not hold any fruit in a precooler that long. We did not dare try it. I did not know or hear of the use of borax in connection with fruit prior to 1923.

We also treat lemons by means of this borax. Before we used the borax treatment on lemons our approximate decay in storage would run round from 3 to 5 per cent. Since we used the borax there is practically none at all. A tree-ripe lemon is one that turns yellow on the tree and is to all appearances ripe and ready to use. Before we had the borax treatment a good many of these tree-ripe lemons went to the byproduct plant and some were shipped to close markets. The by-product plant is the place where they work the lemon up and get the lemon oil and the citric acid and other things. We now have more lemons than the market will use to advantage. Consequently we are sending some lemons to this aforesaid by-product plant which would be perfectly all right to ship anywhere. We merely send them to the by-product plant because they are [fol. 75] the cheapest grade of lemon we have and we have a certain percentage we have to get rid of other than by shipping and that is the method we use but they would be perfectly all right to ship if there was a market sufficiently large to handle them. We could ship to distant markets.

(Witness is handed a paper.) This is merely a chart that is got out by the Pacific Coast Borax Company to show the specific gravity that we should have on our instruments for testing the water, when there is sufficient borax in to make the percentage that is prescribed in the Government formula, as they call it. We have such charts in our houses. The charts come from the Pacific Borax Company to the Supply Company. They furnish the charts to them because they are selling their borax. We get them from the Supply Company. We use the charts in our plant. We have them nailed on the wall where the operator can see what his figures are, read with these testing instruments. He has an instrument that he puts into this borax solution to get the specific gravity. From the chart, in conjunction with that instrument, he can tell what the concentration of the solution is at any temperature. We did not receive charts of this sort. That is, they did not send

them out to everyone. We get them by asking for them. I got that one. I do not remember just when; something like a year ago. I never saw anything of this sort prior to that time. This is something that came into existence, as far as I know, about a year or two ago, when they first started to handle the borax from this company to the packing houses.

(The chart is offered and received in evidence and marked "Plaintiff's Exhibit No. 64.")

I have previously been asked about the borax treatment with the tree-ripe lemons. We can now ship them to a distance which we could not do before.

[fol. 76] Cross-examination:

In 1924 64 per cent. of our cars were iced. This is on Navels alone, 64 per cent. were iced, and in 1925 there were 8 per cent. iced. That is, all our Navels for both of those two years. I have not got the number of cars for each year, the actual number. I have the number of boxes in 1926, but I have not got it for 1925. The other cars were shipped under standard ventilation. They were shipped in two ways. The oranges were not cooled before they went into the car but were taken from the packing house and directly packed into the car. As I have previously said we had approximately 13 per cent. decay in 1922-23, approximately 11 per cent. in 1923-24. Those were the two seasons that we did not use borax. In 1924-25 we had 8 per cent. decay and in 1925-26 we had 6.7. These last two years we did use the borax treatment.

SIDNEY O. CHASE

SIDNEY O. CHASE, of Sanford, Florida, called as a witness on behalf of the plaintiff, testified as follows:

Direct examination:

I am at present connected with Chase & Company, of Orlando, Florida. I am president of the company. They

are packers of fruit. I gave birth to the company in 1888. I was a grower and packer in 1888. There were a great many growers non-producing in Florida at that time. So that I got into the business about as early as Florida got into the fruit business. I have been working in the citrus industry there all the time from then till now with the exception of about four years. After the destructive freeze of 1894 and 1895 we were temporarily out of the business till the industry came back. I am still a grower and a [fol. 77] packer and I am also a shipper. I am not an association but a commercial packer, a sort of an outlaw, I guess. I pack fruit for a great many growers other than my own groves. I have been through their various groves, and have been over their packing houses in Florida from year to year. I am a member of the Florida State Horticultural Society, and have been for a good many years.

We have always suffered from rot but I do not recall the blue mold feature of it until 1899. Whitefly came in several years after that. In 1899 we were not washing the fruit. We did not have any whitefly and the fruit was not supposed to need washing. The fruit was picked and sized and graded and packed mostly by hand. We first began to wash the fruit about 1910 or 1911 after the whitefly. I am more acquainted with the results of whitefly than what it is. There is a sort of honey which drops first on the fruit and covers it, a sort of smutty mold, covers the rind and makes it very unattractive.

We have always suffered from decay. It depends a good deal on weather conditions when the fruit is picked. The decay we suffered from may have been blue mold, but I have never referred to it as blue mold. When we began washing it seemed to increase the percentage of decay some. We started washing by machine instead of by hand. Our only control of blue mold decay was to be very careful as to the weather conditions when we picked and packed and avoid doing anything in bad weather and acted in good weather or what we considered good weather. We did not make any difference in handling in order to avoid blue mold decay.

I know Mr. Ramsey. I was in touch with the work of the United States Department of Agriculture. They made recommendations to me with reference to blue mold decay.

[fol. 78] They had what they called the careful pick and pack method; use more care and we would eliminate quite a percentage of decay. A commercial pick and pack and a careful pick and pack which is quite expensive, is quite another matter. If we followed the recommendations of the department we could not have operated, but that developed a good deal of the decay was due to rough handling which we could not help. We have to hire a class of help that pick by the box or pick by the day, that will do more or less damage to the fruit when they gather it. I could not say to what extent I reduced decay as a result of my commercially careful handling. We never kept any accurate record fro mseason to season as to what decay we had in the early days.

I first heard of the use of borax in connection with citrus fruits in the fall, I believe, of 1924. I received a bulletin or circular from the Department of Agriculture at Washington recommending the use of borax to prevent the blue mold decay. The strength of solution recommended was, as I recall it, a 4 or 5 per cent. solution. They suggested a temperature of about 75—70 to 75 degrees, I think. I used borax several times previous to 1924 to soften the water where we had very hard water, and our washing was not what it should be, we tried to soften the water. If you soften the water the dirt comes off easier.

After the receipt of this Government circular that I spoke of as having been received during the fall of 1924, I installed an outfit in one of our houses to experiment with the use of this borax solution. I discussed the matter with an employee of the Department of Agriculture before I made that installation. It was a Mr. Fulton who was at that time in Orlando in the employ of the department and I had some discussion with him. We made these experiments that I spoke of in our Sanford Packing House. We [fol. 79] started immediately, as soon as we could after I had received this circular in the fall of 1924. The strength of solution and the temperature used was practically that specified by the department. We attempted to follow the instructions. I did not, at that time, know that Mr. Brogden had an application for patent on file. I am still using the borax treatment. I have taken a license under the Brogden patent.

In the season of 1924-1925, prior to Christmas, we only used one house, and during the closed season, between the closing and the opening up in January, we installed outfits in ten or twelve of our houses. We have got it in all of our houses now with the exception of one or two houses where we handle grapefruit. We do not need that treatment so much with grapefruit for grapefruit is shipped from the East Coast, which is usually shipped early, and we have never been troubled much in that section.

The use of borax has reduced the decay considerably and we have been doing picking and packing and shipping during periods of weather which we used to close down on account of being unfavorable. I have never kept a very close, accurate estimate as to just what the saving was, but it is very marked.

We apply the borax to our fruit in the following manner: We have a washing machine, which is a spiral washer, and the fruits are carried there about eighteen feet and the last five or six feet of the washer we have a spray of borax water solution on the fruit as it passes the delivery end of the washer. The fruit goes from the washer to a drip rack and then into the drier, and then from the drier into the grading belt, then to the sizer.

The sales department gets reports as to the percentage of decay, if any, which shows up at the destination. Mr. A. M. Pratt is our sales manager. I operate or own now about thirteen or fourteen packing houses. The amount of [fol. 80] fruit we pack in a year varies for different seasons, but I suppose it averages close to 700,000 boxes during a season. Probably a third of that amount is our own. In one of our houses we are using the full Brogdite-Brogdex treatment but not at any of the other houses. We just have the borax or boracic acid in the other houses. We are using the Brogdite-Brogdex in the Nocatee House.

(Witness is shown a report on the letterhead of Chase & Company dated January 10, 1927, appearing to be issued by Mr. Pratt.)

That is a report on the amount of decay covering the shipments from November 23d to December 14, 1926. It seems to refer to a number of houses under the heading of Terra Ceia and Dunedin. That is Mr. Skinner's dis-

trict. All the other houses are ours. We operate them with the exception of Terra Ceia and Dunedin, which are not our houses. Mr. Pratt gets up things of this sort from time to time. I see them as they are issued by my company. I read them over for my information.

The Nocatee House is one of the houses that is using the borax and the paraffin both. The period from November 23rd to December 14th covered roughly the hurricane we had there on September 17, and the fruit at this house was more or less scarred and blemished on the rind, which we considered as one of our worst specimens of fruit, shipped and delivered to destinations in good shape. That particular windstorm did not affect the other houses so much. The houses are in separated districts, all except Arcadia. Arcadia is treated similar to Nocatee, but those are the two similar in the district.

On this sheet which I have just looked at, for each district there are given the number of cars shipped in the period and the number of cars decayed; that means the number of cars in which any decay was found. The next column is "per cent showed decay." That is only a per [fol. 81] cent. of the total number in comparison with the total number that showed decay. The next is "Average decay shown." That means the average decay in the cars that showed decay, that is the average decay in the car as it is shown. The next column is the "day's en route," that means the number of days from the time the fruit left the packing house and was delivered to the purchaser.

My only knowledge as to the correctness of the statements as to decay that are in this circular resides in the fact that I requested Mr. Pratt to get up the statement and that is what he handed me. I do not know whether Chase & Company keep books showing the thing from which report is tabulated, but they have got the records from which that was extracted. We have our own inspectors around to follow our cars in each market where they are delivered. We get returns from our own inspectors and they come back to us as inspected and then we tabulate them. I am president of Chase and Company.

(Report offered and received in evidence and marked "Plaintiff's Exhibit No. 65.")

Cross-examination:

I have no interest in the plaintiff company here.

I have no figures with me of decay for different seasons.

X Q. 102. It is true, is it not, that decay varies considerably in different seasons according to the weather conditions?

A. Yes, sir.

X Q. 103. And other conditions?

A. Yes, sir.

X Q. 104. And that the percentage of decay in one season can not be compared with that of another season on one item that might possibly affect it?

[fol. 82] A. If it is a whole season I think we would have our average weather conditions during about seven months each year during the shipping season. In those seven months, I think our average condition would be very similar, although there are parts of that season that are sometimes worse than others.

Before we used any borax at all, the decay varied considerably from season to season, say from 5 per cent. one season to a higher percentage some other season. I do not known as we ever had 10 or 12 per cent. in any one season, but we had a heavy per cent. in individual cars. I do not think our total ever went that high, as 10 or 12 per cent. in any one season.

I have no connection with the Skinner Machinery Company.

Redirect examination:

I have no connection with the Brogdex Company except that I pay them royalties.

LEE B. SKINNER

LEE B. SKINNER, of Dunedin, Florida, called as a witness on behalf of the plaintiff, testified as follows:

Direct examination:

I am a fruit grower and I also have a hotel that takes a good deal of my time, but I am mostly a fruit grower.

I pack fruit. I have been engaged in the growing and packing of fruit for forty-four years. I shipped last year 85,000 boxes; I ship from 80,000 to 130,000 boxes a year. I was for a number of years president of the Skinner Machinery Company of Dunedin. I gave it to my children some years ago and my connection now is very nominal. I have been in Florida all the time since 1883 engaged in the citrus industry there. At that time I owned an orange grove.

[fol. 83] These figures that I have given of the amount of boxes that I ship annually now, is both for oranges and grapefruit, about half and half, I would judge. I have several groves now and they aggregate about 500 acres.

In the early days I was troubled with blue mold. I did not do anything to prevent the effects. Of course, in the early days there were no diseases hardly and no trouble and we picked the fruit from the trees and put them into the box and sent them to the market and the chances of injury were very poor and we could select the season for shipping easily and our losses were sometimes heavy but not very heavy from spotting. The whitefly came along about in 1910 or 1911. That is, in our district, some districts a little bit before that. I had not been washing fruit up to that time. I saw it coming in 1909. I saw that the white fly was spreading and coming to our territory and that the Government would compel us to wash sooner or later. There was very little washing in Florida. They were washing in California.

I came in touch with what they were doing in California when I went there in 1909. I went there with an expedition of Florida fruit growers to California to inspect the Californit Fruit Exchange and incidentally I went to look at their washing machines. The only machine they had there was the Limoneira and it was so complicated it did not appeal to me and when I came back to Florida I got to thinking about it and invented the Skinner washer which is used very widely nowadays. I think that probably 60 per cent. of the washing in Florida is done with the Skinner washer, perhaps more. Then some other washers that use the same principle are in use. My patent was a very poor patent at that time. It was not broad enough. Florida

climatic conditions make the fruit more susceptible to decay [fol. 84] from blue mold than in California. The warmth and moisture make that difference.

I took precautions not to injure the fruit in the way of handling it, especially after the Government called our attention to it. I worked with the Government people very frequently. I have tried chemicals in my wash water, such as blue stone and permanganate of potash. Blue stone is sulphate of copper. I could not be sure of what these chemicals accomplished but I used them with the idea of sterilizing the water. I sometimes thought maybe they did have an effect on the blue mold, and sometimes I thought maybe they did not. We had a lot of decay. I think I used the permanganate sometime twelve or fourteen years ago. I used it until the war and then I stopped because potash became so expensive. I tried bluestone but I do not think that that was as satisfactory as potash.

With the best that I could do up to 1923-24, the decay sometimes ran very high, 30 or 40 per cent., sometimes. I have no figure in mind as an average. We used to ship under refrigeration but we used no pre-cooling. I am talking of oranges. We did not ship all our fruit under refrigeration before 1923. It would depend on weather—not so much on the season of the year as the weather.

Our refrigerating charge on the fruit from Florida to New York was about $60 to $75 a car. According to Florida practice, the number of boxes in a car is 300 as a minimum and generally 360; a great many cars have 330 boxes. Refrigerated fruit, when taken out from under refrigeration, has a tendency to decay more quickly than if it was not refrigerated.

I am at present president of the Florida State Horticultural Society. I think this is my fourth term as president. I have been a member a good many years. I attend their meetings regularly from time to time. I never knew prior [fol. 85] to 1923 of anybody having used or proposed the use of borax to eliminate or decrease blue mold. I do not know whether I heard of the use of borax in connection with citrus fruit in any way or not. I know now that a great many people used it for softening the water and I may have used it myself, but I don't remember. While I

was with the Skinner Machinery Company my business did not take me into packing houses very often. My son was the Skinner Machinery Company.

In 1924 and 1923 and the preceding years, I was in touch with some of the experts of the Department of Agriculture, but not with all of them. Mr. Fulton—mostly I think with Mr. H. R. Fulton. I knew Mr. Ramsey very well. I discussed the problems of blue mold decay with Mr. Ramsey in years gone by but not in 1923 and 1924. He has been in California for a great many years. He belongs to the California society. I discussed those things with Mr. Fulton prior to 1923 and 1924, and also in 1924 and 1925.

Prior to 1924, neither Ramsey or Fulton, or any other Department of Agriculture experts with whom I talked, suggested that I should use borax or boric acid to stop blue mold decay. I first heard of that, in the fall of 1924. I think Mr. S. O. Chase wrote me about it first, and then I heard about it from Mr. Fulton. I heard from Mr. Fulton about it by word of mouth and by correspondence. He wrote—we had quite a little correspondence back and forth in regard to it and the formula to be used. (Witness is shown letter.) This letter is one which I received at that time from Mr. Fulton.

(Letter offered and received in evidence and marked "Plaintiff's Exhibit No. 66.")

I think some time after that letter and my other talks with Mr. Fulton on borax, either in December, 1924, or January, 1925, I am not clear what the date was, he came [fol. 86] to my office and discussed the borax proposition. The action I took in installing borax was as a result of that letter. I think I installed some of the borax in 1925 and more effectually in 1926. I am using it now. I have a license from the plaintiff here. The strength of borax solution I am using is, I think, 4 or 5 per cent., between 4 and 5 per cent.

Prior to using this borax treatment, I used the Brogdex treatment but I abandoned it. I am using the paraffin treatment now in conjunction with the borax treatment. I abandoned the paraffin treatment when I was using it alone, on account of the decay mostly. I had heavy decay and

while I was not sure it was the Brogdex I felt possibly it was. I was not sure about it. It did not do me any good as far as blue mold was concerned. At the present time with respect to the use of the paraffin treatment when used in conjunction with the borax treatment I find that the use of borax has a tendency to make the fruit shrivel if used without the paraffin and if it is used with the paraffin it keeps a polish and is desirable. The paraffin prevents shrinkage.

Before I used the borax system I refrigerated frequently but did not pre-cool. I have never used refrigeration since I have used the borax treatment, unless it was specifically ordered by the customer. It is an unusual occurrence to have a specific order of that kind. Our yearly saving per box on refrigeration alone would depend on how many cars were refrigerated. The cost of refrigeration is around $70 a car, and I think at least I can safely assume a saving of fifteen cents a box.

I have previously given some of my figures on decay for the months of November and December, 1924, and my figures on decay in the corresponding months in 1926. In November and December, 1924, I was not using a borax treatment. My percentage of decay in those months was [fol. 87] very heavy. It was all the way from 5 to 30 per cent. That is, in the cars showing decay there was from 5 to 30 per cent. of decay in that car. I do not remember exactly the percentage of the cars showing decay but I think there were a good many cars that showed decay but I could not say the exact percentage.

There was a report here that was put in evidence through Mr. Chase which gives for those months the decay in percentage of cars in which decay showed in the shipments from the Dunedin house; that was my house in 1926. In November and December, 1926, we shipped thirty-three cars of which three cars showed decay, and the average of those three cars was 9 per cent. My recollection is that one of those cars showed a very heavy decay and it was evidently due to some mechanical injury I think in the equipment. I mean in our packing house equipment. Probably a nail somewhere got where it did a lot of damage. That one car was out of line with the others. That

heavy decay is included in this 9 per cent. The 9 per cent is the percentage of the total cars which showed decay.

The Mr. Chase who was testifying yesterday is president of Chase & Company, who are packers and shippers and distributors in Florida. They are one of the chief concerns in the State, and one of the largest packers.

The only Brogdex companies that I know of are the Florida Brogdex Company and I understand there is a California Brogdex Company which finances the Florida Company, I think. I am a stockholder in the Florida Company.

Cross-examination:

I do not know that there is any relation between the Skinner Machinery Company and the Florida Brogdex Company. The Skinner Machinery Company manufactured the machinery that the Brogdex Company installed, [fol. 88] I believe. I am not personally much interested in the Skinner Machinery Company, though I know a little about it. I would not say that the Skinner Machinery Company is a sort of installation agent, as it were, for the Brogdex Company. They have not an exclusive license from the Brogdex Company for installing machinery in Florida. The Skinner Machinery Sales Company had that contract to which you refer, which is another company. I have one share in the Skinner Machinery Sales Company that I never paid for. The controlling interest is in my son, or I do not know about that, who has the controlling interest.

I have no data here as to my per cent of decay for the entire season 1924-1925. I don't recollect it, the entire season of 1924. No, I have not any data as to the entire season for decay except that I know we closed down in February of 1925 and put in a spraying system of borax which was not entirely successful but it helped a good deal. We put a little pump alongside of the washing machine, and at the lower end of the washing machine as the fruit left the washing machine we sprayed the borax solution on it. The fruit was still on the brushes of the washing machine when they were sprayed. We sprayed it on about three feet of the length of the brushes. I heard Mr. Chase testify yesterday. He had an arrangement similar to what I have

just described. I saw the memorandum of his and I followed after his plan. The borax I used in that arrangement was mostly a cold borax solution. I could not tell you the percentage. It had as much borax in it as cold water would take up, although I am not sure about that. Sometimes it did, sometimes it did not. It was very crude. It was put in under my direction.

My idea was to use what the Government formula stated. I found it relatively effective. I found afterward that the [fol. 89] hot solution, with a 4 or 5 per cent solution of borax with the fruit staying in there I think two or three minutes, was—I found that that was almost essential to a well-preserving of the fruit. That is, I had to have the fruit in the borax a certain length of time; you had to have it in hot borax in order to get perfect results. Afterward I installed the machinery so we could keep it in under the borax solution under a certain heat and with a certain strength of solution. We had perfectly wonderful results.

I have no definite figures on the decay that I experienced with that first arrangement for applying the borax, and our present arrangement, as a licensee of the plaintiff. This decay I have been speaking of, is probably not all blue mold decay. Our fruit suffers from other kinds of decay beside blue mold such as stem-end rot. Stem-end rot is sometimes very bad. Part of this decay that I have been talking about was the stem-end rot, and part was blue mold decay. I found that a hot boric solution with a certain length of immersion would lessen the stem-end rot very much also.

There is no distinction made in our reports from the markets, as to the kind of decay but sometimes the fruit is sent to us so that we can inspect it and see what the decay is. The bulk of the decay is from blue mold, from injuries, and the bulk of the balance is from the stem-end rot. Blue mold decay is everywhere, and stem-end rot is not I think everywhere. Stem-end rot is an infection of the tree, and it comes from a certain kind of fungus. The blue mold rot is just the common rot that is present all over the country, I believe.

I do not think we have refrigerated any cars this year now that we are using plaintiff's full treatment. The lack

of refrigeration has no effect on the freshness of the fruit. I do not think there is any effect at the present time, with the complete process, I do not think there is any effect. [fol. 90] The wax treatment primarily preserves the freshness, and the borax treatment is to prevent the decay. The wax treatment prevents shrinkage and keeps its freshness and gives it an appearance of fresh fruit, while the borax keeps it from decay. Fruit not treated at all begins to shrink as soon as it is picked and that process continues until it either rots or dries up, I believe. Shipping fruit on ice lessens that shrinkage while it is on the ice, or being iced, I think it does. Of course, it does not stop it after the fruit is warm.

I know that the number of cars that showed decay in the period of 1924 that I testified about was very great, I should say it was more than 15, I should think, out of about 40 or 45. That was an unusual amount of decay. Probably the weather conditions were bad. Probably the picking too was careless. That was an exceptional amount of decay for my experience prior to this borax treatment I am glad to say.

I stated previously that I had used copper sulphate in the wash tank to prevent blue mold. I had a circular issued by the California Lemon Company which recommended it for that purpose. It was recommended for the brown rot in that circular. I tried it out to see if it would do any good on the blue mold on the orange. I also said that I used permanganate of potash. That was suggested also by the same circular. That is when I first heard of it.

I never heard that borax was a common food preservative. In a discussion with Mr. Fulton in December, 1925, we were discussing this and I think that is the first time that I did ever hear that borax was used for any such purpose at the time this came up and he said that they were investigating, going back into all the records they could find to see if they could find whether borax had been used for citrus fruit or any fruit just then. He said they had not found anything that amounted to anything up to that time. [fol. 91] The per cent of our fruit which was refrigerated before I adopted any borax treatment depended upon the climatic conditions during the year. If the weather was

moist and warm we tried to refrigerate everything we could, but if the weather was cool and dry we did not refrigerate. There were some periods during the year when we would have it, but the amount varied from year to year. When I first used this borax with the sprinkler that I described, I do not think I made any change in the number of cars I iced at that time on account of the borax.

CHARLES IRVING CARTWRIGHT

CHARLES IRVING CARTWRIGHT, of LaVerne, Cal., called as a witness on behalf of the plaintiff, testified as follows:

Direct examination:

I am secretary and manager of the LaVerne Cooperative Citrus Association. I have been with that association in that capacity since the organization was formed in July, 1924. The LaVerne Cooperative Citrus organization packs fruit. It does not directly sell its fruit. It sells its fruit through the Mutual Orange Distributors of Redlands. The Mutual Orange Distributors is the sales agency for the members of the association. The Mutual Orange Distributors sell but does not itself pack or grow.

I entered the citrus industry in 1917 as a laborer in a packing house and worked for two years, and in 1919 I became foreman of the Randolph Marketing Company in Glendora and held that position for three years, then I was assistant manager for one year, and then in 1923, to March, 1924, I was manager of their plant. From that date [fol. 92] I was working in the position I now held.

The average annual pack of the Laverne Cooperative Citrus Association is about 190 cars. Our first season we packed approximately 190 cars. It is a new organization. The second season we packed approximately 196 cars, that is oranges I am speaking of. We packed several cars of lemons, but we did not consider those very much.

We use the borax and paraffin treatment. We began doing that in 1924-25. We have a license from the Brogdex Company. The matter was called to my attention by Mr. Brogden in the fall of 1924, when we were building our plant

and I took it up with our board of directors and we went with Mr. Brogden to see two plants that were installed at that time. One of them was the Walnut Association that had used it the year before, the season previous to that, with very good success, which I was told by Mr. Wolstencroft, whom I thought was very reliable, and the other plant was in Azusa, which is also another plant. We were very favorably impressed and we installed it. Only the Walnut House is in the San Antonio Exchange.

Since we began using borax treatment we have used it in substantially the same way up to the present time. The strength of solution we have been using depends on the temperature of the water. It runs about six to six and a half and sometimes a little stronger. In the process a large soaking tank is used where we put the chemical in hot water and the oranges are dumped in this and submerged and taken on up through the spiral brushes and the same water is sprayed on the oranges as they come through the brushes and they are taken off at the end and elevated down in another solution of the same water and brought back and rinsed off with clear water and from there they go on to [fol. 93] the drying and on up to the paraffin.

Our first year's decay showed approximately 14 of our cars shipped showing decay, which was an average of 7 per cent of the cars, and the total for the decay was approximately one-half of one per cent, the first season in all cars shipped. Half of one per cent. is the percentage of oranges decayed. The second year our decay was two cars or an average of one per cent. of the cars showing decay which was practically no decay at all. It is barely eight-tenths of one per cent. I cannot tell what was the percentage of decay in the two cars that showed decay, but the total average decay of all fruit shipped is eight-tenths of one per cent. The second season was the season of 1925-26. That season was approximately normal.

The LaVerne Cooperative Citrus Association with which I am connected has always ever since its organization used this borax treatment. In my experience prior to that time in the other houses with which I was connected, they were not using any borax treatment. I followed the amount of blue-mold decay which they had in those previous years in the other houses when they did not use borax treatment

quite closely because I kept the books and I had the record of all the fruit that showed decay, as I was bookkeeper for them at the same time. The decay was considerably heavier in those houses than at any time since we have used the borax treatment at LaVerne. By considerable I mean from 4 to 5 per cent. more. That means 4 to 5 per cent. more of the cars showed decay. The decay in each car was generally heavier in these previous houses. In my experience before we used the borax system we thought that by careful handling and precooling we would get away from the decay which it did to a certain extent but not entirely. We shipped entirely under refrigeration in the early days. We [fol. 94] ship some fruit under refrigeration now at the LaVerne house. I would say about 30 per cent. of all our fruit sent out now is shipped under refrigeration. Before we used the system about 80 per cent. was sent out under refrigeration.

I am familiar with the practice of picking the fruit. Our organization sends out its pickers to the groves of our members. (Witness is shown an orange and asked if it has any defect in it of any kind, any bruising of the surface.) It has a clipper-cut from the picker right near the stem-end. The surface has been a little cut or abraded. That is a clipper-cut caused from the overreaching of the clipper. (Witness is shown another orange.) It seems to have a little puncture or even a long stem. It has a hole in it that goes sufficiently through the rind to decay it. I am familiar with bruises of this character. Before we used the borax treatment we threw away fruit of that sort. Since using the borax system, we ordinarily pass through such fruit as that when it has been punctured. We do not pay any attention to that, so far as decay of any kind. I spoke of long stems; this other orange illustrates that only it is not so long as some of them. The stem ought to be cut off very much closer than in this orange.

There is nothing about these oranges that indicates to me whether or not they have been subjected to the borax treatment. Knowing only the apparent condition of the orange, I cannot see anything on them that would indicate it except on account of the firmness. I cannot see anything on it with my naked eye. There is no blue mold on these oranges.

You do not see the borax with your naked eye on the oranges that you treat with borax unless you run it too strong and do not rinse them. We try not to show the borax. I can tell from looking at these oranges that they have been under paraffin treatment. They seem to have had paraffin [fol. 95] treatment. The brightness that seems to be on them indicates to me that they have had the paraffin treatment. There is a skin over them that you would not see on an orange that had not been treated.

Since installing the borax and paraffin treatment, we have shipped to foreign markets. Previously, when we were not using the borax treatment, our shipments to foreign markets had considerable decay. Now, in shipping to foreign markets we do not have any trouble at all.

I have made an estimate generally, not accurately, of how much more the growers who are our members, receive for their fruit per box since we have been using the borax treatment. I would say on a conservative estimate approximately twenty-five cents a packed box. The items I take into account in making up that twenty-five cents are the difference in the cullage. We pack approximately 5 per cent. more fruit than we packed otherwise, and we are saving approximately two cents a packed box on the machinery that is installed and kept in repair by the Brogdex Company and the decay would make up the difference. This culling that I speak of is done by the graders, as the fruit goes over a belt, they pick out the defective oranges and they go into a cull bin. There are a number of people standing beside the belt to pick out the oranges. We do not cull so much as we did, because oranges that formerly we threw out on account of the keeping quality, we now pack. Clipper-cut oranges and the punctured orange such as I have been shown, and oranges that show splits on the end if they are not too severe, now, we pack them. Before, we threw them out. (Witness shown an orange.) This orange indicates what I mean by the split. Those oranges would ordinarily be thrown out. There is no blue mold on that orange. I do not know what causes that split. It gets in the orange in some way.

[fol. 96] We are able, as the result of this borax and paraffin treatment, to pack some two pounds less of fruit in the box. That is where we are able to pack our boxes with

less poundage to start with, because we do not get the evaporation and shrinkage that we did before we were using it. The consumer, or the public does not lose by that, because the fruit does not shrink. That lack of shrinkage is not due entirely to the paraffin. I may say part of it is due to the borax.

The picking and handling of lemons differs from oranges. Lemons are supposedly picked to ring sizes and are picked green and stored for curing, except we have tree-ripes that do not seem to grow so fast, and they are picked small. Prior to the use of the borax solution, we were storing them, and we shipped the tree-ripe lemons immediately to nearby points. We now sometimes store tree-ripe lemons as long as thirty days and then ship them anywhere we want.

There is such a thing as drops. Drops is the fruit which gets over-ripe and drops, i. e., falls off the tree. Before using the borax treatment we left drops on the ground. They were just wasted. Now we pick them up sometimes and ship them. If there are many under the trees, why, we pick them up. We do not ship them very far. They are sold to nearby markets. Before we could not ship them at all. When fruit drops from the tree it gets bruises from the ground and abrades from the limbs of the tree that it drops through. The limbs abrade the surface.

Cross-examination:

I do not know where the fruit that is before me came from.

Culling fruit is done by the graders. It is done along the belt as the fruit comes out of the dryer. I could not say how fast the belt moves. Regardless of how fast it moves, it depends how much fruit comes over how many [fol. 97] graders we have. We have sufficient graders as the fruit rolls to pick out the culls. I have never checked up how many boxes there are to the grader. We use four graders for two cars. Generally there are four graders in the packing house and two cars daily shipment depending on the quality of the fruit. If it is good quality four can handle it; if it is inferior, why, they can not. The graders pick out anything that is split open or has a big hole in it where it shows all the meat or something of that kind,

would be a cull. The shape of the oranges have nothing to do with it. The grader does not pick out misshapen oranges. They are not culls. Oranges that show green color are not culled out. We pack them.

The grader makes the distinction in his grading between those that have a good color and those that have bad color. We pack three grades. We have the first, second and third grades. The green oranges would be in one of those lower grades. The grader picks out the oranges as they come by and puts them on a belt for No. 2 and No. 3. He picks out No. 2 and No. 3 and lets No. 1 go by. He puts the culls in the basket. The grader has a fourth belt that he puts culls on. As each orange comes over he looks at it and puts it in the grade to which it belongs. He does not look at each particular orange as it rolls over. He picks out those oranges that he grades. I wouldn't say he picks up every orange and looks at it. It would be impossible.

I cannot give a figure as to how many oranges there would be in two cars. There are 462 boxes in a car. The sizes of the oranges run from 360's to 80's; 80 of the largest in the box and 360 of the smallest. They run up to 400 in a box; 396's, that is the smallest fruit packed. An average of those two figures would probably be higher than an average run. There would be about 200 to 216 to an aver-
[fol. 98] age box. The four graders handle all that fruit if it is good quality. If it is bad quality, we put on five or six graders, i. e., we put on one or two more.

I have worked for the Exchange. The Exchange has regulations about culling the fruit. I am not familiar enough with them to tell what they are. I have not worked with the Exchange for seven years.

We put fruit such as I have indicated there as having a clipper-cut and a hole and a split in our best grade fruit if it is not too large, but ordinarily the one with the split on it would go in the third grade. The per cent. of culls we have now averages one and 46/100ths of 1 per cent. In the fall season we run 90/100ths. That includes all of the fruit that comes to the house. That is all packed in one, two or three grades. The culls are not packed, of course. All the rest of our fruit is graded in three grades and packed and shipped. I would let the clipper-cut and the nail hole such as I have shown here, go in our best grade

if the orange is otherwise all right, i. e., if it is not bad in other places. For a small clipper-cut like that, we would not throw it out. Before we adopted this borax treatment we would throw it out. We did not employ any more graders before we started this borax treatment because we have always used the borax in this plant. It is not humanly possible, however, to get every one of the injured oranges out, even though you are trying your best. There are some oranges that get by anyway, although we tried to keep them out.

The per cent of oranges like that, that come into the packing house at all depends on our pickers. We try to make our pickers be as careful as possible. We do not permit them, if possible, to have more than four in a field box. The field box holds less than a packed box. The relation is about three field boxes to two packed boxes.

[fol. 99] The foreign markets we ship to are Liverpool; Southampton. We ship by water from the Pacific coast. The Pacific coast fruit, judging from the houses that I worked in, was not shipped that way before borax was used. I never knew of fruit to be exported until the last two years, to my knowledge. I won't say it has not been done. I said in my direct testimony that previous to using the borax, fruit was shipped to foreign markets but had more decay in them. I did not say exports. We shipped to foreign markets, in Eastern markets here, before we used borax. We now export fruit. We never did that before.

In packing, I said we put less weight of oranges in a box now than we did before. The box requires a certain number of oranges in it to meet the regulations. We get a less weight in because we formerly had to pack the oranges much larger in the box to meet the poundage, heavier than we do at this time. Now we can put smaller oranges in for a given grade than we could previously. We size them a little bit smaller than we would if we were not using this treatment. Size 216 refers to the number of oranges in the box. Not every orange is smaller now but we turn the sizes a little closer. I know that other houses besides ourselves are engaged in this export trade. Some are Exchange houses. All Exchange houses that I know of that are engaged in that trade are using borax. This export trade is a comparatively recent development to my knowledge.

Redirect examination:

By packing these smaller oranges, when that box of oranges comes to the consumer he gets a shade smaller orange than he used to. I won't say that he does only that we cut out fruit, the larger oranges, that we used to have to use to get the regulation box. He s still getting 216 size oranges.

[fol. 100] I have no interest in this case. Neither the members of the LaVerne Association nor the members of the Mutual Orange Distributors, have any interest in this case so far as I know.

ROY LEE HENDRIX

ROY LEE HENDRIX, of Covina, California, called as a witness on behalf of the plaintiff, testified as follows:

Direct examination:

I am manager of the El-bar-dor Company, a citrus fruit house situated at Covina. It is a packing house for oranges. The fruit is sold through the Mutual Orange Distributors, started in the citrus industry around 1912. I worked in the groves then in California. I became connected with the El-bar-dor house in the 1921-22 season. I first became affiliated with the Mutual Orange Distributors through the handling of my own fruit in 1914. In 1917 I went in as manager of a packing house which was selling through the Mutual Orange Distributors. The El-bar-dor house sold through the Mutual Orange Distributors beginning in 1921-1922.

Prior to 1924 we were taking all the necessary steps to prevent blue mold decay that we knew of at that time, which was nothing more than the use of bluestone solution, copper sulfate. We were cautioned to use all the care that could be used in the handling of the fruit. We got practically no results in the retarding of decay from the use of bluestone. It had no merits to speak of. We are now using borax of the Brogdex system. We began doing that at the beginning of the 1924-1925 season. The strength of borax solution used is about 6½ to 7 per cent.

Before we introduced that system, our percentage of cars showing decay would run as high as 21 to 25 per cent. [fol. 101] in our section. We would have decay quoted as high as 40 to 50 per cent. in a car. This decay had considerable effect on the prices we got for the fruit in many instances. The decay would be so heavy that we would receive practically no returns from the car at all. In some cases, the car would pay freight, in some cases it would not. Since we adopted the borax and paraffin system, the decay on our shipments has been lessened considerably. In the past year we cut our decay down to 7 per cent. on our cars. For the average of the season it showed eight-tenths of 1 per cent. of our total shipments. Seven per cent. of our cars showed decay, and our total average decay on the fruit shipped for the season was eight-tenths of 1 per cent. There were no other elements that I know of in there other than our change in our system of treatment that brought about the decrease in decay. This last year, 1925-1926, was not a particularly good year. We have always been subject to very heavy decay in our section, and there is very little difference from one year to another. It was just about an average year.

Before we put it in the borax and paraffin treatment, we would have to start refrigerating in March, and continue throughout the year up to the close of our season, which was usually some time in October. We refrigerated about 85 to 90 per cent. of our cars. The first year we used the borax and paraffin system we only refrigerated 5 per cent. of our cars. The second year about 30 per cent. I am talking of oranges entirely. We pack both the Navel orange and the Valencias. We do not ice our Navels now but just part of the Valencias. The Valencias ripen from the first of May, and we handle those through May and June on up to the first of November.

We make shipments up into the northwest territory by freight or steamship. We ventilate those shipments. We are refrigerating the shipments in the South and to the [fol. 102] East. We are refrigerating principally because the trade demands it. The buyer is very reluctant about getting into a hot car to inspect or examine the fruit, and they have been accustomed to receiving ice cars so long

that they have sort of a prejudice against inspecting ventilated cars through the summer months. The fruit is sold in the car at private markets. In an auction center it is unloaded.

Our annual pack from the El Cajon house is about 200 cars at the present time. We averaged approximately 7 to 8 per cent. of culls before we put in the borax treatment. Since that, we have averaged in the neighborhood of 2½ per cent. of culls. If a drop is in perfect physical condition, and the outward appearance is good, it is graded into our first grade and shipped. It depends on the appearance of the orange what grade it goes into. We did not do that before we used the borax treatment. Then the drops were thrown into the cull bin. Now I estimate that we ship 75 per cent. of the drops that are picked up. A small percentage, possibly 5 per cent. of those would be culled. The drops are a very small percentage of the total crop, possibly not over 2 per cent. ordinarily. In many cases, not that heavy.

We save net for our growers on refrigeration about 13 cents a box. Now, taking into consideration what I have spoken of as the reduced amount of culls and the salvage from drops and the lesser decay and the saving of ice and refrigeration, I estimate that we save our grower, by the use of the borax system, from about 40 to 50 cents a box.

I am personally acquainted with a majority of the packing houses in our section of the country whether members of the Mutual Orange Distributors or not. I know that all of the houses in our district, whether licensees of the Brogdex Company or not, are using the borax wash. And since I have been connected with the industry in California, I [fol. 103] have been quite intimately in touch with the manner in which our competitors have been treating their fruit. We visit back and forth in the various houses for the purpose of keeping up with all new methods or improvements that have been installed. We talk with each other about the methods of handling fruit, using different washes.

Prior to 1924, I had never known of the use of borax in connection with fresh fruit or boric acid or anything of that sort. We did use washing powders in our water, but we do not any more.

The boxes are packed above the top, giving them a bulge, so that they will be full when they arrive at this end. Today

we do not have to make that bulge quite so high to have them arrive in the same condition owing to the treatment of the borax and the Brogdex solution. I mean that the boards on the top of the box are bulged up. The fruit would settle in the box and leave a space between the top and the fruit.

I have no interest in this controversy. I have no stock interest or other interest in the Brogdex Company or any Brogdex Company.

Cross-examination:

I said that before we took up this Brogdex treatment, I mean the whole treatment, 21 to 25 per cent of our cars showed decay. The average decay in those cars was not 40 to 50 per cent. I said that we had cars showing as much as 40 to 50 per cent. decay. The average decay for the shipping year I could not tell you. I have not those figures. I have no figures on the decay except the per cent. of the cars showing decay. We had 7 to 8 per cent. culls before we took up this borax treatment, i. e., an average of 7 to 8 per cent. per year. We followed quite closely the standard set by the California Fruit Growers Exchange in their picking. [fol. 104] They were very careful as we were in regard to all clipper-cuts, penalizing the picker for making clipper-cuts and also no drop fruit was allowed to be picked up from under the tree. If a picker dropped an orange it laid on the ground and they were not allowed to pick it up and we followed those instructions as closely as we could. I do not recall what per cent. clipper-cuts were permitted in the field box.

We pick up practically all of the drop fruit now excepting rots. The actual percentage would vary with the condition of the trees and also the fruit. Over-ripe fruit would be at times quite a percentage of drop. I would say 5 to 6 per cent. sometimes might be picked up under a tree of over-ripe fruit. At other times when the fruit is not overly-matured you would not get possibly over two or three oranges under a tree or the oranges that the pickers dropped when they are on the ladder. Any orange that falls on the ground is a drop, either from the picker's hand or loosened from the stem, allowing it to drop. The drops

are a small per cent. of the total number of oranges early in the season.

JOHN H. RIECKE

JOHN H. RIECKE, of Anaheim, California, called as a witness on behalf of the plaintiff, testified as follows:

Direct examination:

I am secretary and manager of the Anaheim Co-operative Orange Association, which is a member of the Mutual Orange Distributors. I have been with the Anaheim Company since I have been in the citrus industry. I was elected manager in January, 1921. In the past year the annual pack of our association was 1003 cars. Those are oranges [fol. 105] alone. We do not pack any lemons. The oranges are mostly Valencias.

We are using the borax and paraffin treatment under license of the Drogdex Company. We began in the season of 1924-25. We have a record of the losses through decay that we had previous to that time. We have a book that we keep our losses in. We received our reports from the account sales. We don't have our own inspectors out on the road, but the Mutual Orange Distributors has its inspectors. The reports come to us through the Mutual Orange Distributors. We have followed the same practice since we have been using the borax treatment.

Comparing our losses through decay prior to using the borax process with our losses since that time, in 1923-24 our decay showed in 39 cars an average of 4 per cent., while in 1925-26 we shipped 1004 cars, and 12 showed decay. I think that the use of the borax treatment has affected the total amount of our output. It has by getting in growers, growers getting educated so that they did not want their fruit all thrown away. More growers have come to us for packing.

There are no other different conditions in our packing house that would bring about a greater output since we have been using the borax treatment. We have not the same cullage as before. The cullage is just about half of what it was before we began using borax. We have been

able to reduce our cullage because we are able to pack fruit now that we could not pack under ordinary conditions. We give the grading girls different instructions now from what we used to as to cullage. As to drops, any orange that drops on the ground, that is a good sound orange, we pick it up and pack. We put it through the regular culling operation. Prior to the time that we were using borax treatment, we used to throw drops away.

[fol. 106] In one specific instance we were able to save a large amount of drops. Last season one of our growers had to fumigate his grove and through some mistake of the fumigator his fruit dropped and the fumigator applied too strong a dose and the grower told me that his fruit was dropping and we picked it and we estimated there were 1200 boxes that were picked from the ground and packed. If that had happened before we had the borax treatment we possibly could have saved some of it, but not all. As it is, we took, not the whole crop, but everything that was sound.

With reference to refrigeration, prior to using the borax treatment we start ordinarily about the 1st of June and sometimes the 15th of May with refrigeration. We refrigerate very nearly the same percentage of cars now that we used to. Counting our few Navels that we have we probably save about 25 per cent. on refrigeration. That saving amounts in dollars and cents for 1924-1925 and 1925-1926 to very close to $40,000 each year.

In my experience in the export business the borax treatment has had an effect on it. It has increased because of the better keeping qualities of the fruit. At the present time our house is the largest house in Anaheim. Five years ago it was the smallest.

Prior to our use of this borax treatment I had never known of borax being used in treating citrus fruits in any way. Five years ago we used to pack lemons and we used bluestone in our washing tank on lemons. We used nothing in our orange washing except soap powder and that was done to clean real dirty, smutty fruit. The bluestone or soap powders did not turn out to be effective agents in reducing blue mold.

I have no interest in this controversy in any way, nor have any of our board of directors or members of our association.

[fol. 107] Cross-examination:

Dropped fruit is subject to bruises of all kinds and stone bruises on the ground. The rind of the orange is affected. It very seldom causes an internal rot of the orange. The bruises on the rind would cause blue mold within forty-eight hours. Before this borax treatment enabled us to save some of the dropped fruit we culled out those that showed a bruise just like we culled out those that showed clipper-cuts or other imperfections. We made a practice of picking up all the sound oranges and running them through. We have always done that.

I know only the number of cars that I have shipped and the percentage of decay in the cars. I took those figures off our books before I came. I took off our books figures on our icing or refrigeration.

Our pack is practically all Valencias as a rule. There are very few Navels in our district. This year we had 24 cars of Navels. Last year we had 26 cars out of 1004 that were Navels, and the rest were all Valencias.

We have no pre-cooling plant at our place.

Redirect examination:

Before we used the borax treatment, we did not ship our drops. They were culled, *i. e.*, thrown away in the culls.

CHRISTIE PRESCOTT EARLEY

CHRISTIE PRESCOTT EARLEY, of Redlands, California, called on behalf of the plaintiff, testified as follows:

Direct examination:

I am general manager of the Mutual Orange Distributors. I became general manager in 1918. From 1890 on [fol. 108] I began to buy oranges in Florida up until 1908, when I went into business for myself in Boston as a fruit broker. From 1918 I occupied my present position. Mr. Hendrix has testified here as manager of the El-bar-dor packing house, and Mr. Cartwright as manager of the La-Verne Packing Association. Their associations are members of the Mutual Distributors. There are 35 members

or affiliated associations in our organization. I should have said there were 33. There are 35 packing houses and 33 members. These members are associations that own packing houses locally. Some of them maintain packers, that is, some of them pack at a profit.

The Mutual Orange Distributors markets the fruit, but does not grow any fruit. We have various brands in marketing the fruit. The principal brands belonging to the M. O. D. are the Sunflower and the Poppy, Pansy and Golden Rod. These brands belong to all the members of the Mutual Orange Distributors.

These packing houses are located both in Southern and Northern California. There are six members in Northern California. The Mutual Orange Distributors has a license under the patent here in suit under the Brogdex Company. That license is available to members of the Mutual Orange Distributors. All of the members of our organization in Southern California are now operating under that license with the exception of one, and that one has not had time to install it. The members in Northern California have not installed it as yet. They have not started to install it.

As to the method that is used, I heard Mr. Hendrix and Mr. Cartwright testify. All our houses are using it in practically the same way. In Tulare County up in Northern California during the Navel season oranges, when they are matured, are more or less green at the beginning of the season. Using the whole formula of the Brogdex system, [fol. 109] it retards their coloring and for that reason it is desirable at the beginning of the season not to use it but there is a demand there for it, for the Navels shipped out later after they are fully colored as well as for those who are shipping Valencias. These are Valencias that are grown up in Tulare County. The Valencias are a little earlier than the Valencias in the South.

Our houses began using the borax system in the season of 1924-25. They began using the paraffin system at the same time. We used the paraffin in its experimental stage two years previous, but it was not wholly a success. We installed it because we believed it would carry better, but in some instance it did and in some instances it did not particularly in time of damp weather. We gave up using paraffin there in the interval between that time and the time we used the borax. Now we use both paraffin and borax.

Our Mutual Orange Distributors market from 12 to 15 per cent. of the annual pack of oranges from California. We are the second largest shippers in California; the largest is the California Fruit Growers Exchange.

Ever since I have been with the Mutual Orange Distributors I have been concerned in attempting to prevent blue mold decay. Our efforts prior to the use of borax to prevent decay were directed mainly for the fruit's careful handling and grading. I first heard of the use of borax in connection with fresh fruit in 1923. I heard of it then from Mr. Brogden. We started using the borax treatment in 1924-25. Reports I got collectively from our managers as to the borax and paraffin treatment have been more than satisfactory to all our organizations. I have not wholly made any estimate of the amount of decay that we have eliminated by the use of the borax treatment. I mean that I have not the [fol. 110] figures in all of our organizations available.

About refrigeration, we save some in that connection. The saving in comparison with our refrigeration before is considerable, but I have not the figures. Generally, fruit holds up very much longer when it has been boraxed. We have tried experiments and found that with the same fruit, picked at the same time, and put into bunches at the same time, that it has held up two or three times longer.

Since I came to California I have been as closely in touch as possible with our associates and our competitors and with what they were doing in the way of treating fruits. I have been through several houses. I never heard of any use of borax or boric acid prior to 1923.

(Witness is shown some oranges.) Those oranges came from one of our associations at Redlands, California. The name of the association is the Foot Hill Groves. They are using the Borax process in the treatment of those oranges, i. e., the borax and paraffin process. When the borax treatment was first called to my attention, it had been experimented on for one season at the Exchange Walnut House, at which Mr. Wolstencroft, who testified, was manager, and then I had every one of our association managers investigate the same thoroughly on his own behalf and report the findings. It was unanimous that it was a splendid advancement in the keeping of oranges, and then I brought the matter to the attention of our board of directors, and they in

structed me to make a contract for our entire organization.

I spoke a moment ago of having had some experience with the paraffin treatment, without the borax, some years before we took up the borax. We took part in assisting in the development of that paraffin treatment. We advanced [fol. 111] them money. We advanced the money to Mr. Brogden, and I have forgotten the other party. They were then in Florida. That money has been paid back. Neither have I nor has any of the Mutual Orange Distributors any financial interest direct or indirect in the Brogdex Company, or the outcome of this suit. We advanced Brogden in the prior days six thousand dollars. Our interest was for the development of anything that would prevent or assist in getting the fruit to the market in better condition. That money was simply loaned, to be returned out of the money that we would pay if it did work.

Cross-examination:

The houses that used this process pay a royalty to the Brogdex Company.

The fruit that I said stood up two or three times longer had received the borax and the wax treatment.

Re-direct examination:

Before I took up the borax treatment, I found that the paraffin treatment was partially successful in reducing decay. We did not keep on using it because when the fruit was damp it rather acted adversely. Now, we use the paraffin treatment in addition to the borax treatment. The borax solution kills or prevents the blue mold, and the paraffin simply stops the withering of the fruit and keeps it in a fresh-looking condition. We use both in all our houses except those that I have mentioned.

Re-cross examination:

I have not the per cent. of our total shipments from Northern California where we do not use the process, or the per cent. from Southern California. Roughly we handle around 600 cars in the North, and our total is about 7000 cars.

[fol. 112] STAFFORD W. AUSTIN

STAFFORD W. AUSTIN, of Los Angeles, called as a witness on behalf of the plaintiff, testified as follows:

Direct examination:

I am connected with the American Potash & Chemical Corporation. I am the manager of the Los Angeles office. I handle the sales for the Pacific Coast. I have been connected with the American Potash and Chemical Company since 1913. It was formed at that time. In 1913 and in the succeeding years I was looking after their property, securing their titles. I became manager of the Los Angeles office in 1917. The matter of using borax in connection with the treatment of fresh fruit and particularly citrus fruits came to my attention in the summer of 1923. It came to my attention through Mr. Brogden and the Mr. Barke who is connected with the Brogdex Company. They called on me for the purpose of purchasing borax. We have supplied them contiuuously with borax from that date, from June or July, 1923. I did not know in 1923 when they came to me what they were using that borax for. Shortly afterward, in August, 1923, I was told all about it. They told me that they were using it for the purpose of treating oranges and for the purpose of killing blue mold. My company has furnished to the Brogdex Company from 1923 on in California a little over 400 tons, I think it was 405 tons. In 1923 we furnished them, I think, only four tons, it may have been a little over that; in 1924 we sold them about twenty four tons and in 1925 230 tons and since then 146 or 147 tons, i. e., up to a few days after January 1. I do not remember exactly.

The present price of borax in carload lots is from $80 to $85 a ton. We are naturally on the lookout for any new use of borax. Out on the Pacific Coast we interview every pos-
[fol. 113] sible source that we can think of and make inquiries from different users as to other uses that they have heard of. In our New York office we have a technical man who tries to look up different uses for borax. I have been located in Southern California continuously since 1910. I think I went there in 1909. During that time I did come in touch with the citrus growers or packers. We were hand-

ling potash as well as borax and through my connection with the fertilizer companies I was in connection—that is, I have known of the problems and difficulties of the citrus growers in that way. I had heard of their problems in connection with blue mold decay in talking and discussing with orange growers and fertilizer men. I never heard at any time of the use of borax in connection with citrus fruits or other fresh fruits prior to 1923. The name of my company when it was first organized was the American Trona Corporation. It adopted its present name last July. There were no instances to my knowledge in which my company sold borax to any fruit grower or packer in California prior to 1923. My Company does not at the present time supply borax to others than the Brogdex Company. My previous statement was meant to be limited to the production for citrus growers. We sell borax to other people for other purposes. I did at one time make a contract of sale of borax for use with citrus fruits to other than the Brogdex Company. In the year 1925 we sold borax to the Fruit Growers Supply Company. That company is the purchasing department for the California Fruit Growers Exchange. We continued to sell the California Fruit Growers Supply Company until we received a notice from the Brogdex Company that the patent was issued to them.

We then entered into an arrangement with the Fruit Growers Supply Company for the cancellation of their contract. Since then we are selling only to the Brogdex Company for use with citrus fruits.

[fol. 114] Cross-examination:

We do not sell a good deal of borax to drug stores. That is, we do not handle the drug business here at all. I know borax is sold to drug stores. We probably sell it to wholesalers or distributors that do sell it to drug stores. I am only in touch with the California sales. We do not do it out there but it may be done through our California—through our New York sales office. In California before the Brogdex Company came along, we sold to the enameling companies and the glass manufacturers; that is, makers of bottles and different glass works and those were our only customers out there. We have not yet sold any whole-

sale druggists or distributors of any kind. I know of the antiseptic properties of borax to a certain extent. I know that before the passage of the Pure Food Act, it was widely used as a preservative agent in regard to meats. Well, that is all I have a personal connection with—personal knowledge of. I do not know to what extent the use of borax is prohibited in foodstuffs. I did look that up one time, what the rules were, but I am not in touch with it now. I do not know if it was used a great deal with butter and canned goods, and all sorts of things, before the passage of the Pure Food Act. I am not posted on that. You see, we only began manufacturing borax in 1917. My knowledge does not go back of that. I was not in the borax business at all back in those days.

X Q. Did you ever make efforts to sell borax to any food manufacturers of any kind before this Brogdex treatment came along?

A. No, sir, I did not. I did not know they were in the market for it at all.

X Q. All you knew of it was that they came and ordered borax from you, is that right?

A. That is right. That is my first knowledge of it. I know about the effect of borax in fertilizer. If you get [fol. 115] over a certain amount, the effect is injurious on plant life. In a small amount it does no harm, but over certain amounts it has been—after a very thorough investigation by the Government, it has been declared injurious. The Government took that action in 19—this intensive investigation of the subject started in 1920—1919 and 1920 and extended over several years of investigation, not only by the Government itself, but in many State Agricultural Departments tests were carried on in regard to the amount of borax that could be contained in fertilizers without injury or with injury. That was the result largely of the impure fertilizers that got on the market during the war; I think that the per cent. that is forbidden is 1 per cent. I know that information with regard to the injurious action of borax was pretty widely distributed by the Government and by other organiaztions that had investigated it. State departments were carrying on a certain amount of work, and they also gave publicity in their findings. It was contained in their bulletins.

WILLIAM R. MILLAR

WILLIAM R. MILLAR, of Beverly Hills, Cal., called as a witness for the plaintiff, testified as follows:

Direct examination:

I am an attorney-at-law. I was admitted to the California Bar in January, 1908. I am the secretary-treasurer of the Brogdex Company of Florida, and secretary-treasurer of the Brogdex Company of California, and counsel for both companies. The California Company owns the control of the stock in the Florida corporation and has been financing its operations. The California Company is only a holding company, and the Florida Company is the oper- [fol. 116] ating company. Neither company is a grower or a packer or a shipper. The Florida company was incorporated early in 1922, and the California company was incorporated in the last of November, 1922. At the time the California company was incorporated it took over control of the stock of the Florida company. The Florida company had expended approximately $325,000 at the time the California group became interested in its operations, as revealed by the books at that time. This money was expended in Florida and in California during the early part of 1922 in demonstrations, experiments and installation of equipment for the application of the paraffin process in various houses in Florida and California. Now, since the California company acquired the stock of the Florida company, the California company has been advancing money to the Florida company. It has advanced approximately $600,000 to date. I should say in addition to that sum, the Florida company has flowed back into its business earnings of about $300,000 additional. Those earnings came from, almost entirely, operations in California where they were received on installations made there, some small proportion of that from Florida during the last year and a small amount from apples in the Northwest. We have patented this Brogden and Trowbridge invention, as well as the paraffin process in many foreign countries; in Mexico, Guatemala, San Domingo, San Salvadore, British Honduras, Brazil, and most foreign countries. It fact, in all countries where any fruits and vegetables are grown

in large commercial quantities. We have given a foreign license to the firm of I. W. Schlesinger & Company of Johannesburg, South Africa, covering the Union of South Africa, and the Islands of Madagascar and Mauritius. We have made a contract with the Mutual Orange Distributors [fol. 117] of Redlands, California, under which contract all their member associations are permitted to use the process upon the payment of the royalty stipulated, and have made contracts with eight individual association members of the San Antonio Fruit Exchange, Pomona, California; and the contract with the Azusa Orange Company. That comprises the contracts in California. Our license to the Mutual Orange Distributors, is to the Mutual Orange Distributors and not to its member associations. I have the original of that license to the M. O. D. here.

(A copy of the license agreement dated September 9, 1924, between the Brogdex Company of Florida and the Mutual Orange Distributors, it being agreed it may be received in evidence with the same force and effect as the original, subject to correction, is offered and received in evidence and marked "Plaintiff's Exhibit No. 67.")

All the other licenses issued in California have substantially the same terms of royalties and other general provisions of this license to the Mutual Orange Distributors. Royalties have been paid under all these licenses. In Florida we have executed a contract giving to the Skinner Machinery Sales Company of Dunedin, Florida, an exclusive license for the use of these processes on citrus fruits in the State of Florida. So far as I know, this is its only business, i. e., it is a licensing organiation there. I have the original of that license from the Brogdex Company to the Skinner Machinery Sales Company here.

(A copy of that license dated June 18, 1926, which it is agreed may be received in evidence with the same force and effect as the original, subject to correction, is offered and received in evidence and marked "Plaintiff's Exhibit No. 68.")

We have been receiving royalties under this Skinner license. In Florida, the royalties come through the Skin- [fol. 118] ner Machinery Sales Company and not through

the individual packers. The amount of royalties we have received up to the present time under all these various licenses is reflected in the statement that I made of the earnings of the Brogdex Company. Practically the entire revenue—gross revenue of the company has been from royalty. The amount I mentioned was about $325,000. I spoke a little while ago about the use of this treatment on apples. During the past season they treated approximately 1,300,000 boxes of apples in Washington. The season before that about 175,000 boxes and prior to that the treatment was confined to demonstration treatments, I should say an aggregate of 1,000 boxes were used during the previous years in demonstration and experiments. The paraffin treatment had been used almost exclusively until during the latter part of last season there has been an arsenic spray problem that has become acute in the Northwest and we have made demonstrations of the success obtainable in using the Brogdite treatment for the removal of the arsenic spray and it was anticipated that both processes would be installed in all cases where future licenses are granted. I might add that we have given exclusive licenses for Oregon, Washington, Idaho, Montana and the Province of British Columbia to a company formed by several men interested largely in apple growing in the Northwest, known as the Northwest Brogdex Company on a royalty basis. The only growers I know who are stockholders in either of our two Brogdex companies, California or Florida, are Mr. Skinner of Dunedin, Florida, and Mr. Wallace, the president of the Brogdex Company, who is a small grower. It may be that a few shares of stock in the Florida Company are owned by growers and I do not know whether they are growers or not.

[fol. 119] Cross-examination:

I cannot tell you first hand what the action of the borax is in removing the arsenic spray. I have never seen it done, but it is my understanding that it is used to loosen the residue that remains on the apple and the apple is then put over washing brushes in the same fashion so that the residue is removed. The apple is sprayed with an oil spray after the arsenate of lead spray is applied to hold

the arsenate of lead on there and that is what causes the difficulty in removing it. Borax helps dissolve it off. I said the Florida Company expended something like $325,000 in exploiting the original wax process, that is reflected from the books at the time the California interests took over the control of the company. I cannot say whether the books show how much of that was advanced by Mr. Chase or not. I just secured that information by asking my accountant. I cannot recall having heard of Mr. Chase as one of the original contributors. I know many parties in Florida interested in the citrus industry who were much interested in the developments of the company during its early days. It was my understanding that most of it was obtained from the sale of stock in the Brogdex Company and voluntary assessments of that stock from time to time. I do not recall that Mr. Chase was ever a stockholder. And the California money that was spent, I should say that most of it was not spent on the wax proposition. It is quite the contrary. From the time the California Company first took all interest and control, its board of directors was well satisfied that complete success would not be obtained unless some method of controlling blue mold decay was found in addition to the paraffin process and no substantial effort was made to secure contracts for additional installations of equipment to apply the paraffin process after the first of the early part of 1923. We employed [fol. 120] chemists and began experimenting and then as soon as the discovery was made began demonstrating the success of the borax process; and the expenditures that have been made have been made in installations of complete equipment for the application of both processes. I cannot state how many installations, using wax alone, were made in California. The majority of those installations were made before I was an officer of the company or had any connection with it at all. I became an officer of the company in January, 1923, and I would say that none were made after January, 1923, for the use of wax alone. I am not certain how many were made prior to that time. I think there were four members of the San Antonio Fruit Association, four association members who had some time or other had equipment in their houses. I think there were possibly three or four other houses besides. I do not be-

lieve over a dozen more. I may be a little in error one way or the other on that. The total amount of money that had been spent by the company when I became an officer, prior to my coming in as shown by the books, as I stated, was about $325,000. That included both Florida and California, and it included money spent by the predecessor of the Brogdex Company, the Brogden, Ricketts & Haworth Company. I estimate that as the total expenditure of all the predecessors of the present company up to the time I went into the company in January, 1922. Our chemist is M. L. Trowbridge, who was the co-patentee with Mr. Brogden, and we have at times employed outside chemists. Professor Crowell, of the University of California, Southern Branch, has been employed by us. Various laboratories in Los Angeles had been employed by us from time to time to make tests and analyses and things of that kind. Mr. Lee equipped a laboratory suitable for our needs at our factory at Palms, California, and Mr. Trowbridge has been [fol. 121] in charge of that laboratory collaborating with Mr. Brogden, and doing work by himself, with the assistance of other employees during Mr. Brogden's absence. Mr. Trowbridge was first employed in November, 1922, I believe. He was already employed before I became an officer of the company but not before I became interested in the company, but before I became an officer of the company. I was informed by clients of mine, who were officers of the company, that an investigation of this Brogdex Company and its process was being made, and that at that time in November it seemed likely that they would take or purchase control of the Florida Company, and I was requested to prepare the necessary papers to incorporate the Brogdex Company of California, this was pending at that time. That was the only interest I had before I became an officer of the company. The first commercial installation, using both parts of the process in substantially the same form as it is now applied, was made in the last two months of 1923, I believe, at the Walnut Fruit Growers Association packing house, Walnut, California.

I said the California Company controlled the Florida Company. The California Company does not own all the

stock of the Florida Company. There is a small minority interest.

JESSE J. PARRISH

JESSE J. PARRISH, of Titusville, Florida, called as a witness on behalf of the plaintiff, testified as follows:

Direct examination:

I have been connected with the citrus fruit industry in Florida ever since 1899 as grower and packer of citrus fruit. My present occupation is the same. My house in [fol. 122] Florida is under my own name, J. J. Parrish. I am a grower, shipper and packer of fruit. We have an output of between a thousand and twelve hundred cars per year. That includes oranges, grapefruit and tangerines. About 80 per cent. of the output is oranges. I am one of the licensees under the patent in suit. We began using that system in November, 1926. That was our first season of its use. That system, as we are using it, is borax solution, that is, it is prepared in a tank, you know, of a certain strength, where the fruit is run through it, and then we use—after that has been dried, we use a little oil, paraffin oil. We use in the solution eight ounces of borax to the gallon. All of our fruit that has been shipped this year has been treated with this borax solution. I have not had any decay this year, where I shipped under ventilation, to amount to anything. When I speak of having no decay, I mean a dozen oranges or two dozen to the carload, that would show decay, but not as in former seasons. I have shipped 90 per cent. under ventilation this year. Last year and in the preceding years I have used ice, and iced fully 90 or 95 per cent. of my fruit at times with an average throughout at least 75 per cent. of my fruit was iced. The blue mold was 1, 2 and 3 per cent., probably more, around 2 or 3 per cent. in any other way. This has been an average season so far as the condition of the fruit in concerned before shipment.

Cross-examination:

I am associated with other companies, the Eagan Fickett & Company and Nevins Fruit Company. The Brogdex system was installed at my own instigation in my houses. It was my idea. I have heard representatives of Eagan & Fickett express an opinion as to the value of the treatment. They said it was sure it had done a great deal of good. [fol. 123] They are commission merchants in New York. They do not control the packing houses in Florida. I have an association with them and sell through them. Not all my fruit is sold through them. I sell some otherwise, and ship to other houses.

ERNEST M. BROGDEN

ERNEST M. BROGDEN, called as a witness on behalf of the plaintiff, testified as follows:

Direct examination:

I am the Mr. Brogden, to whom with Mr. Trowbridge, the patent in suit was issued, and I am a vice-president of the plaintiff company. I have visited packing houses of the American Fruit Growers Incorporated, the defendants in this case. I visited the first of these houses in the spring of 1926, March. I visited their house at Haines City in Florida and at New Smyrna, De Land, Mims, Cocoa and maybe one or two others. The Haines City house purports to be an American Fruit Growers house and it has a sign on it. I visited the Haines City house with Mr. B. C. Skinner. He went with me to all of the plants I have mentioned except the Cocoa plant. When I went to the Haines City plant of the defendant I asked for the man operating their borax tanks. I was referred, I think, to a chap named Kohl, but I am not sure. He was there at the plant and he showed me around. He took me down in the basement and showed me the whole operation, as well as a portion upstairs. After making this visit I made a sketch myself that night, I think, of the machinery that I saw there. (Witness is shown sketch.) That is the sketch of the Haines City house. I will describe the operation

that I saw there at that Haines City house when I visited it in March, 1926. They were working on oranges. The [fol. 124] fruit came out of the washer, passed on to a conveyor elevator en route to the drier and as it came out of the washer or just after it had gone on the conveyor it was sprinkled with the borax solution and went on to the drier, through the drier and through a machine polisher and on to the end in the usual way. In the washer that I spoke of, the washer had a small soaking tank before the compartment with the brushes in it. On this drawing that I have there is certain lettering. I had that put on and it describes what I saw there. After the fruit passed from the washer, it was lifted to a conveyor belt and passed along there to the drier and on my drawing of it there are pipes shown above the conveyor belt. Those pipes carried the borax solution from the tank underneath. You will notice a cross-section of the house above that with a pump taking it out. There were small holes in the bottom of both of those pipes and the belt conveyors, the solution through those holes was caught in a tin trough underneath the conveyor and drained back to the tank or sump under the floor. The conveyor was 12 or 14 feet long. The fruit was sprayed with the borax solution throughout practically all the length of the conveyor. It was sprayed until it began to turn to go into the drier. The body or the mass of the borax solution was kept in a little sump directly underneath or somewhat underneath the floor. I went down and saw that myself. There were means of heating the solution but the operator explained that the electrical current short-circuited a day or two before and he was scared to bother with it and so it was not being heated the day I was there. He had oil stoves but when I was there the first time I do not think they were running. He explained when he started in the morning he set the oil stoves up underneath this [fol. 125] tank. I went to this house probably three or four times. They were later visits than the one I speak of. I think they were all in March and April. With reference to the material that was used in this solution which I spoke of, you could see the borax on the fruit as it came out of the drier; you could taste it by merely touching it with the tongue, the alkaline solution, and any one could see

sacks of borax around in piles. The sacks were marked borax from the Pacific Coast Borax Company and you could see the crystalization of borax throughout the machinery, that is, through the drier and at the polisher you could see the borax powder around in little piles like sand, like very fine sand. Mr. Kohl, who was showing me around, made no secret of what solution he was using, of the material he was using in the solution. He told us it was borax and told all about it. I don't remember now just what was said about the strength of solution used. All the operators I talked to were desirous of getting 5 per cent. They told me that, but in some cases their heating apparatus was not working satisfactorily and in fact in most cases they claimed they could not get the water as warm as they would like to have it. I do not remember that there were notices posted up in the particular house.

(The drawing referred to and produced by the witness, offered and received in evidence and marked "Plaintiff's Exhibit No. 69.")

Then on this same day, March 23, 1926, I think it was, we went to DeLand. I think, that was the next house. Skinner and I visited that house. That house is the Volusia Growers, Inc., affiliated with the American Fruit Growers. They had the trade-mark "Blue Goose" on the building, and the manager gave me his card and told me it was the American House in DeLand and his card also had the same wording on it. We were shown through the Volusia Grow-
[fol. 126] ers' house. The manager took us all through and explained the details of operation at length: The apparatus was not the same at the Haines City House. At the Volusia Growers in DeLand, they were using tanks, in which they immersed the fruit after it came out of the washer, whereas at Haines City it was being sprinkled on an elevated conveyor. I made a drawing or a sketch of the machinery and the operations that I saw at the Volusia Growers at DeLand. (Witness is shown sketch and asked what the thing is that is shown up there on the top.) That is the tank. The fruit came out of the washer into this long tank submerger. It was thirty feet long, or something like that. They had the borax solution in that tank.

(Sketch offered and received in evidence and marked "Plaintiff's Exhibit No. 70.")

The fruit was submerged or subjected to the action of the solution in this tank around five minutes. It would vary a little bit according to the speed of the machine. The solution was heated. The manager had a fairly good heating arrangement. He had a boiler out in the yard that he could use and made a fairly good job of heating the boiler. I did not take the temperature when I was there. The house was not running, I do not believe, at that time. It closed down before we got there. He explained at length about the operation. He was using borax in this solution. We saw borax all over the house, that is, around the polisher and that neighborhood.

The installations at the New Smyrna, Mims and Cocoa Packing houses weer fairly similar. There were very little differences in them. The tanks were not as long as this tank in the DeLand house, but otherwise the principle was about the same; that is, they kept the fruit in the tank and the water was warm and the operators told me that the preferred strength was around 5 per cent. In some cases, [fol. 127] I think it was the New Smyrna and Mims, the operator showed me notices posted on the posts marked 5 per cent and the hydrometer reading at certain temperatures. The tank that had the solution in it, at New Smyrna was about 5 by maybe 12. I did not measure those dimensions. I just do not remember them exactly. The fruit remained in this solution that it was passing through from 4 to 6 minutes. That would vary a little according to the capacity of the house, the speed at which they happened to be running. In each of these three plants, the New Smyrna, Mims and Cocoa, I was shown around either by the manager or by the operator of the borax feature. In most cases by the manager or assistant manager. I think it was only in New Smyrna that the manager himself did not show me around.

(A sketch of typical borax treating system in packing houses at New Smyrna, Mims and Cocoa is offered and received in evidence and marked "Plaintiff's Exhibit No. 71.")

As to the temperature that was used at the Mims, New Smyrna and Cocoa plants, one of them said he tried to keep his water around 70 degrees and another one mentioned 80 degrees but it seems their heating apparatus was defective and they had trouble keeping it up to that. That was their complaint. In all of these plants the oranges after they left the borax tank were covered with the borax solution, and after they came out of the drier then you could easily detect by the eye the powdered borax and they were not using a very good method of taking the surplus off and it was easily detected and you could see the little white crystallization for several feet. After the oranges came out of the polisher a great deal of this excess borax was removed.

[fol. 128] I visited the Cocoa plant again after making the first visit there. I think I was there possibly three times in my travels up and down the East Coast. I bought boxes of packed oranges at the Cocoa plant. The assistant foreman, Mr. Mouchet, sold me a couple of boxes or maybe three boxes of packed oranges and a couple of boxes of oranges as they came in from the grove unwashed; took them out of the field boxes. I bought those boxes of oranges, I think it was, in April, the first part of April. I sealed up these boxes of oranges that I bought at that time, and crated them and expressed them to Dr. H. C. Fuller in Washington. I made a subsequent visit to the Haines City house around the 10th or 11th, somewhere close to that, in April. In visiting these various houses I obtained samples of the borax solution.

I sealed up these samples and shipped half of them to Dr. Fuller and half of them to our attorney in Washington, Mr. Steward. In other words, if I got two or four bottles, usually two bottles—one bottle would go to Dr. Fuller and one bottle to Mr. Steward. When Mr. Skinner was with me in visiting all these plants, except one I believe, he obtained samples. I saw him do that. I have had analyses made showing how much borax there is on the fruit that is treated by our licensees by the borax process. In the fall, in 1924, in California, the Exchange was interested in that particular feature. So they took some fruit from our Walnut house and had it analyzed. Their analysis of the boric

acid radical remaining on the fruit after it had gone through the process was two one-thousandths of one per cent. Since then maybe once or twice, more out of curiosity possibly than anything else, we have had analyses made which checked fairly well with the figures furnished me by the laboratory of the California Fruit Growers Exchange, who made this analysis for us in California.

[fol. 129] I am familiar with something that is called Zeltrocide. That is a mixture of borax and sodium carbonate, about 86 per cent borax; around 13 per cent ordinary soda ash and a fraction of one per cent of permanganate of potash and a very small fraction of one per cent of bluestone. That is used very extensively in Florida to reduce blue mold decay on citrus fruit. I first heard of that being used in 1925.

Cross-examination:

I am asked whether the heaters were actually working at any time that I was at any of the plants that I mentioned. The one at Haines City was broken down. It was working, yes, at one time I was there. It was working; they had gotten it fixed up. The electric heater was not working but the stove was working, and also the electrical apparatus in the Winter Haven house was working when I was there one time. I do not believe I have mentioned Winter Haven, but I was there a good many times—two or three times. It is my impression that this house is one of the closely allied houses of the American Fruit Growers. They say that it is an American house, and it has the American trade-mark and uses the American brands, American inspectors. They ship the Blue Goose orange and that is what led me to believe it was an American house. I have understood that right along. That has been my impression. It is a separate corporation, I understand, but it is allied with the others. Of course, I do not know how the stock is held. I do not know whether these houses I referred to, the DeLand house, the New Smyrna house, the Cocoa House, and Haines City, are also separate corporations or not, but at any of the places I asked where were the American fruit houses and any people there will point it out. I have tried that to see. That is the source

of my information as to the ownership of the houses. That is all I know.

[fol. 130] BRONSON C. SKINNER

BRONSON C. SKINNER, of Dunedin, Florida, called as a witness on behalf of the plaintiffs, testified as follows:

Direct examination:

I have heard Mr. Brogden testify just now. I visited the plants of the American Fruit Growers, Incorporated, at Haines City, New Smyrna, Mims, DeLand and Cocoa. I was not with Mr. Brogden at his first visit to Cocoa. I left him at Titusville. I went with him on the second visit to Cocoa. I did not take any part in making these sketches of the plants, of the machinery that I saw at these plants, that have been put in evidence. I never have seen the drawings. I could tell from them. (Witness looks at sketches and is asked whether they correctly represent what he saw at those various places.) Yes, they are very good sketches of them. I was with Mr. Brogden at the time when, as he says, he purchased two boxes of fruit at Cocoa. He purchased two boxes of packed fruit, and two of field fruit unpacked. We took samples of the borax solutions at Haines City, DeLand, Mims, Haven. We took two samples at Haines City, Cocoa, DeLand and Haven and we were in the houses at Mims and New Smyrna also.

We sealed up the bottles containing the solution and sent them on. We put our names on them.

Mr. Neave: Your Honor, Mr. Brogden testified that these samples were sent to Dr. Fuller in Washington. He made a mistake in that. He said he sent them to Mr. Steward, counsel in this case, and Mr. Morton agrees with me that the record may be changed in this respect, that all these bottles were sent to Mr. Steward, and it is agreed Mr. [fol. 131] Steward, if called, would testify that he sent them, he sent one bottle of each sample to Dr. Fuller. They were duplicate samples.

I am president of the Skinner Machinery Sales Company and also of the Skinner Machinery Company. I have held that position since the incorporation of the Sales Company, which, by the way, is now called the Florida Brogdex Distributors, Incorporated, which was incorporated last June, and I have been president of the Skinner Machinery Company for the past six or eight years. Before I became president I was general manager. The Sales Company should be called the Distributors Company now. That is its correct name. It has the licensing of users of Brogdex, under the Brogdex patents in the State of Florida. It does not manufacture fruit-packing machinery. We have had that manufactured at the Skinner Machinery Company for us. I am president of the Skinner Machinery Company, also.

In connection with my business I have been in the various packing houses in Florida that were using machinery. The principal machines are of the standard type, and then certain conveyors have to be built specially for each house, and some changes have to be made sometimes in the standard machines, as to perhaps length or height of discharge, to suit the conditions in which they are installed. I would say fully 95 per cent. of the houses are equipped with Skinner machinery. There are approximately 300 packing houses in Florida. When they first started using machinery in the houses to any extent, except the sizer, that is to say, when they started adding other machines in addition to the sizers, it was in the year 1909, and I worked in the shop of my father in the summer times of the years 1909 and 1910 and in the fall of 1911. I was in the packing houses, the packing houses from 1911 on I was manager of the machinery business. I made trips through the va- [fol. 132] rious packing houses in the State from time to time. I did not know of the use of borax or boric acid in connection with the treatment of fresh fruits until say 1923. Up to the beginning of 1924-1925 season, in the usual lay-out of machinery in a modern packing house in Florida, there was a hopper in which the fruit was dumped, generally, a slat hopper to allow the trash to drop out before it went on to either a soaking tank or a roller belt over which sprays played. In some houses there was objection to using soaking tanks, because of the fear of infection, that

is, there was a belief that the water became infected and spread diseases, such as blue mold or weather tip from one orange to another, so many of the houses stopped using the tanks, and put in these elevators where they use the tank, that was a smaller elevator without the sprays, to take the fruit out of the tank and put it on to a washer. Then it went over a washer which was kept supplied with a supply of fresh water, either from a well or city supply, which rinsed the fruit as the brushes loosen the dirt. From here, it went on to a rack called the drip conveyor which carried the fruit without any rotation usually to the drier. This permitted the excess water to drop off. From there it went into a drier which usually is composed of a conveyor, with rotating rolls, and a blast of air is blown against the fruit, escaping between the rolls as it leaves the oranges. From the drier the fruit went to a polisher, which was a machine very similar usually to the washer, except the brushes were made of hair, instead of fiber. That is the lay-out which is still used in these houses which do not use the borax treatment. In that lay-out I would say eight or ten years ago, there was some use of bluestone or permanganate of potash in the water which was spasmodic and finally it was abandoned altogether. Once in a while we ran across somebody using washing powder in their water.

[fol. 133] Prior to 1924, in Florida the temperature of water used for washing the fruit in the packing houses in most cases was the ordinary temperature, that is to say, whatever the temperature of the water happened to be coming from the well which was generally up about 70 degrees. In some cases, in order to assist in the drying of the fruit, they would use the water which came from the engine, if they had engine power, which was a warm water, and this would overflow into the soaking tank and thereby warm it, and it warmed the fruit and assisted in drying, and made it evaporate more quickly. I think that practice persisted in Florida. Of course, with the advent of electric power, the number of gasoline installations became less. The gasoline engines were taken out and replaced by motors and the use of hot water had disappeared with the disappearance of the engine. I know of instances within some 7 or 8 years prior to 1924, when heat was used in the water. I have in mind one particular house at Seffner. The use of hot water

at that time was rather unusual. There was a very small percentage of the houses using that.

I first heard of the use of borax, to reduce blue mold decay through my father getting word from Chase & Company that the borax would reduce the blue mold. That was in 1924. I did not go to California until 1925. I went there to investigate the use of borax under the Brogdex process with a view of securing the rights for the State of Florida. We negotiated the contract at that time, but it was not actually closed until after my return to Dunedin. Some trading back and forth in regard to terms and so forth.

This machinery that I have been talking about, we do not sell but lease. The licenses that we issue in Florida are practically the same, yes, sir. (Witness is shown a pho- [fol. 134] tographic copy of a license dated June 24, 1926, between the Skinner Machinery Sales Company and Brockett and Parrish of Titusville, Florida, which appears to be a completely executed license.) That is the license that we issued to Parrish. We have issued licenses to fourteen customers and about twenty-seven packing houses in Florida. In most of them the royalty specified is uniform. In the case of Chase & Company, they have thirteen houses which are using the borax treatment only in which the royalties are slightly different. I have not the photographic copies of the other licenses which we issued in Florida but I have the originals at the hotel. I have the original of this Parrish license in case anyone wants to see it.

(The photographic copy of the Parrish agreement which is agreed may be received in evidence with the same force and effect as if it was the original is offered, and received in evidence and marked "Plaintiff's Exhibit No. 72.")

We have a uniform lease in connection with the machinery. (Witness is shown copy.) This is a copy of that lease.

(A copy of the lease is offered and received in evidence and marked "Plaintiff's Exhibit No. 73.")

The total pack of the licensees in Florida for the past season up to December 31, 1926 is approximately 500,000 boxes. That is about ten per cent. of the entire Florida output for

that same period. We installed the first complete plant to the Brogdex specifications last fall. We put in a rather make-shift apparatus in Mr. L. B. Skinner's house last spring. That is the spring of 1926. That was a complete [fol. 135] system with the borax and paraffin. Prior to that time we had sold some apparatus, that is the Skinner Machinery Company had sold some tanks to one or two customers for the application of borax.

Cross-examination:

The substance of the lease is that they have the privilege of using the machinery under license for the Brogdite system only. Our company keeps up the machinery and makes repairs and keeps it in order. That is part of the services that we render not for the royalty but for the rent. It is so specified in this fine print here. I have not got one of these in larger type. That is full size. I can read it for you if you cannot read it. I will just read the provision about the repairs to the machinery.

"The lessor hereby agrees to keep in repair said machinery making such replacements of brushes and other working parts as may be necessary to keep the machinery in good operating condition, but it is not required under the lease to make good any ordinary depreciation except to the extent necessary to keep the machinery in good and proper operating conditions."

The money terms of the lease are that the lessee should pay as rental for said term $6,000. This is for a term of three years, as follows, $1600 on the date hereof and the balance in sixty equal payments on or before the following dates, and the dates are given monthly, December 15, 1926, and so forth, until the end of the season, July 15, 1927, and beginning again December 15, 1927, and running to July 15, 1928. The third year they pay no rent, it being understood that the cash payment is the advance rental for the third year. The third year rent is paid in advance in cash.

[fol. 136] In 1909 in Florida they were using sizers only, except that in washing of grapefruit they did use a washer which in some cases is known as a Warner washer. Grapefruit were cleaned earlier than oranges for the reason that

they had scales which detracted somewhat from the appearance of the fruit. I have heard of the Nye washer. I could not say when that came out. There never were many of them ever used. The Warner washer came out before my time. I can just remember it as a boy around the packing houses. My father had one in his house. I am now thirty-seven years old. I cannot remember specifically if my father was using it at the time in 1909. I was at school at that time and during the operating season, during the packing season I would be away at school, Stevens Institute of Hoboken, New Jersey, and I was not at home during the packing season, so that it would not be impressed on my mind. I do not know much about conditions prior to 1909. It was the appearance of the white fly in the State that brought about the use of washing more generally than it had been before. The white fly came around about that time, it is my recollection, because our business was started by my father's invention of the Skinner washer, and I remember the first year we made about twenty-five of those washers and that was the only machine that we made at that time. That was during the summer of 1909. I have heard of the Limoneira washer. There were a few of those bought in California in the year 1909 by the people that went out from Florida on that trip to California when they investigated the California Citrus Exchange and they brought back some of those washers to Florida.

(Bureau of Standards paper No. 495, in which Fulton is a co-author and develops the germicidal action of ultra-[fol. 137] violet radiation, is offered and received in evidence and marked "Plaintiff's Exhibition No. 74.")

Mr. Neave: In connection with the Zeltrocide matter that Mr. Brogden testified about, I offer in evidence a copy of fifteen sheets which it is agreed are a true and correct copy of the bulletin of the Florida Citrus Exchange issued at Tampa, Florida, to the directors of the Florida Citrus Exchange, dated December 6, 1925, and it is further agreed that this copy may be offered in evidence on behalf of the plaintiff with the same force and effect as the original subject to comparison with the original and that the licenses and leases appearing on this contract, on the seventh to

thirteenth pages may be used with the same force and effect as the original contract.

Mr. Morton: I object to that on the ground of immateriality. The same objection was reserved at the time the stipulation was made.

Mr. Neave: Yes, the same objection at the time Mr. Brogden testified.

Mr. Morton: This is a little further afield, I think. It is not a use, but merely permission to use that they have secured.

The Court: This is what, Mr. Neave?

Mr. Neave: It is a circular from the Citrus Exchange to all of its members setting forth a proposed lease or license that has been prepared for the use of this thing Zeltrocide and it even goes further on the line that we have been talking about as to the use of this borax patent.

The Court: I see. I think that comes substantially under the same ruling as the previous one, Mr. Morton. I think [fol. 138] the objection really goes more to weight than admissibility.

(Received in evidence and marked "Plaintiff's Exhibit No. 75" of this date.)

HENRY C. FULLER

HENRY C. FULLER, of Washington, D. C., called as a witness on behalf of the plaintiff, testified as follows:

Direct examination:

I am a consulting chemist. It has appeared here from the testimony that certain boxes of oranges and certain samples and bottles containing some solution were sent to me, the oranges direct from Mr. Brogden and the bottles of the solution through Mr. Steward. Referring to my notes, the oranges were examined for borax and also there was general observation made to see how long they had kept after they were received. The boxes bore two brand names. One was called the Orchid brand and the other the Derby Winner. They were both marked American Fruit

Growers, A. F. G. Company, Indian River, and they were inspected first on April 15th by myself and my associate, Mrs. Williamson, who attended to all of the inspections after that date. The fruit in the Orchid brand box was unwrapped, while that in the Derby Winner, which also bore the name Blue Goose, was wrapped. We noted on the day that these boxes were opened that the Orchid brand contained thirty-one pieces of fruit that had spoiled completely, which were soft and what we would call rotting and fourteen of them besides that were spotted. None of the fruit in the Derby Winner brand was changed in any way. No spoilage.

Now, the oranges in both boxes were examined for borax and the tests showed that the Orchid brand had no borax [fol. 139] on them, while the Derby Winner brand gave a test for borax. And I might say that the oranges that showed the borax had on them an indication of a white, powdery substance which was not uniform. Some oranges showed none and some showed more than others; but the total amount figured by the weight of the oranges amounted to two one-hundredths of one per cent., i. e., on the total weight of the oranges. I examined these two lots of oranges and found a certain number of them rotten and spotted in one, and no spoilage in the other on April 15, 1926. I did not personally observe them at later days. My associate did and she is here and can testify; but there was a gradual spoilage of the Orchid brand until on May 1st all of the box other than of course what we had used in the tests, had spoiled; but there was only a small amount of spoilage in the Derby Winner brand. Of course, as the work progressed, why, the oranges began to be used up so there was not a great many left toward the end of the work. On April 24th my assistant noted that fifteen oranges of the Orchid brand were moldy, and that on the Derby Winner brand thirteen were moldy. I embodied this in a report that I rendered to Mr. Steward. There were twelve more spoiled on the Orchid brand on the 27th of April and five rotten in the Derby Winner brand. While on May 1st they were all spoiled.

Mr. Neave: May I ask you, Mr. Morton, if you wish to have me call the assistant to testify to this?

Mr. Morton: If Dr. Fuller is satisfied that the observations are correct, I will not be technical about it, your Honor.

(Witness proceeds.)

There were several tests made showing that there was .02 per cent. of borax calculated by weight of the fruit. They were made in two ways. In one type of general test [fol. 140] the oranges were washed with hot water and the solution made slightly alkaline and evaporated, concentrated, and the borax determined in that. By the other test the oranges were peeled after having been weighed, and the peel was burned at a low temperature; that is, as low as possible, so that there was not very heavy ignition and the borax was then estimated from the ash. One of these tests was a check of the other. They checked exactly.

Referring to the solutions that were sent to me by Mr. Steward. I was away at the time they were received and Mrs. Williamson, my associate, who is here, actually received them in person, on June 27th. I think she opened the box—no, she did not open the box. We did not open it until July 9th. We both opened it together. That is, I really broke the package and we examined the bottles and initialed them and I found that there were four bottles of liquid, some insoluble, cloudy matter in them—in the liquid, and all the bottles were stoppered and there was a sealing wax seal on the top of the bottle in which there was impressed a slight mark. It looked as if it was some private mark of whoever collected the specimens. In other words, they were intact. The contents of these bottles were examined for borax. The results varied. The solution taken from the orange-treating tank at Cocoa, Florida, on the 8th of April, contained 6.693 grams of borax in 100 c.c., which is practically 6.6 per cent. A solution taken from the solution tank from the American Fruit Growers, Incorporated, Haines City, Florida, April 9th, showed a content of 5.41, practically 5.41 per cent. borax. The solution taken from a grapefruit-treating tank of the American Fruit Growers Incorporated, Cocoa, Florida, on the

8th of April showed a content of 3.365 grams of borax in 100 c.c. That is practically 3.3 per cent. And the solution taken from a spray head of the American Fruit Grow-
[fol. 141] ers, Incorporated, Haines City, Florida, showed a borax content of 5.612 grams in 100 c.c. That is practically 5.61 per cent. Now, in giving these amounts, I calculated this borax to crystalline borax.

Cross-examination:

In testing the amount of borax on the orange, I washed the borax off in hot water and then analyzed quantitatively to determine the amount. The other test was obtained by igniting the rind, that is, heating it up to a reasonably high heat to drive off the organic matter and then testing the ash remaining for borax. That was, of course, dissolved in dilute acid and the test applied that way. That is the standard method of analysis. The results checked quite accurately. They came out exactly alike. I referred to two brands of oranges that were sent to me. They were the Orchid brand and the Derby Winner brand. The Orchid brand oranges were loose, as I recall. They were the unwrapped ones. The Orchid brand was unwrapped. They were just sent loose in the box. In general, they were smaller oranges and of inferior appearance. I did not test the solutions received for anything but borax. The boxes did not have any indication on them as to when the oranges were supposed to be picked. They were simply sealed around with a wax paper with Mr. Brogden's name on it as if he had sealed them up before shipping them so that I would be sure that they had not been opened before I received them, and the seals were intact in most instances. There were a few that had been broken but most of them were sufficient. They were around the box and it was enough to indicate that the box had not been tampered with. There was no date. There was no date on them at all. I do not recall any date, no.

[fol. 142] ERNEST M. BROGDEN

ERNEST M. BROGDEN, recalled as a witness on behalf of the plaintiff, testified as follows:

Direct examination:

About these oranges that were sent by me to Dr. Fuller, I testified that there were two boxes of the oranges. They were the oranges that had just come through the process at Cocoa City, and two boxes were oranges that had not gone into the process at all. I did not pick out the oranges that had not gone through the process. The foreman did. They were very dirty, of course, because they had not been washed. They were just as they came in from the grove, and Mr. Mouchet picked probably three or four field boxes and said he was giving us the very best he had there, and they were quite all right, except they were naturally very poor-looking things because of the dirt and scale, and they had not been through the washer. Oranges from that same lot were going through the process at that time. They were stacked up at the washer tank, probably a carload. I did not make any inquiries from Mr. Mouchet to give me any particular grade of orange. I wanted them as they came from the grove, the best fruit. I paid $5.50 a box for the unpacked oranges and the same amount a box for the washed oranges, i. e., $5.50 a box for both but the unpacked, I did not get as many oranges as I would have, if they had been packed; so he figured it down to four dollars, I think that is what he charged me, or something in that ratio. I understood I was paying $5.50 for both packed and unpacked. In the unpacked, there was probably ten per cent. less fruit, or maybe less than 15 per cent., less than those that were packed. They were not laid in the box evenly. No attempt was made, and they had not [fol. 143] been put through the machinery and naturally he sold them to me cheaper. I did not see these packed boxes of oranges being packed. They were right at the press where they were being loaded in the car. They had just come there. There was a whole lot of them there, 100 boxes probably, maybe quite a few loaded in the car, and we picked them out.

Cross-examination:

I put those oranges in my car there at the door and took them to Winter Haven, and expressed them from Winter Haven. I was wanting to get to Winter Haven, so I did not

take time to ship them from Cocoa, but took them to Winter Haven in my car and expressed them from there. The box was nailed up there at the packing house for me. The foreman had a man, a darky, come out and nail the box up for me. Then I took them to Winter Haven and sent them by express to Dr. Fuller.

Q. 13. What day was that?

A. I do not remember exactly what day that was, without referring to my reports made at the time, but it was right around, well, say, between eight and tenth or eleventh of April, I think, somewhere along there. I will get that date exactly from my reports.

Mr. Neave: That is all, Mr. Brogden. The plaintiff rests.

Before the defendant begins his testimony I would like to remind your Honor that we were here a week or two ago and the other side made a motion to be allowed to take the testimony of Mr. Frank Bishop and others in California. Mr. Bishop has come East at our request, and we have paid his expenses East, and he is now in New York, and if the defendant wishes to call him, we will be glad to tele- [fol. 144] phone him in New York, and he will come down here at any time he is wanted.

Mr. Morton: I think we want him called.

The Court: Then you do request him to be produced for you as your witness?

Mr. Morton: Before the defendant's case is closed, we would like to have him produced.

Mr. Neave: If he comes any time tomorrow, it will be all right then?

Mr. Morton: Yes.

Mr. Neave: Very well.

Mr. Morton opens for defendant.

Defendant's Proofs

Alfred B. Michael

Alfred B. Michael, of Wabasso, Florida, called as a witness on behalf of the defendant, testified as follows:

Direct examination:

I am a fruit grower and shipper. I am employed by the American Fruit Growers. I have been with the American Fruit Growers since they were organized in 1919. I am a director of the company and in charge of the packing operations in Florida. In that work I visit the packing houses of the company and supervise the packing and see that it is being carried out properly. I have been interested in the same or other capacity in the citrus industry in Florida for about twenty-five years. Before my connection with the defendant I was a grower mostly, though I was interested to a certain extent for a few years before I became associated with the American in packing in a small [fol. 145] way. That was at Indian River. I had experience as a packer for two or three years prior to 1919 though I had been more or less familiar with packing operations for the last twenty years or more.

The conditions that favor this blue mold decay are moist, warm weather; in other words, the spores breed much more rapidly in moist and warm weather, foggy weather. The growing conditions have a good deal to do with it. In other words, fruit grown on certain types of land is much more subject to blue mold. On the types of land we have in the State—we have various types—our higher lands, the fruit is higher and carries better and is not as easily subject to decay as on the lower land, and of course some seasons when we have moist, warm weather, we are much more subject to decay than if we have cool, dry weather. Those decay periods sometimes last for a few weeks and sometimes just for a week and then we can go through a period without much trouble from decay.

One of the houses of the defendant is at Wabasso. The defendant company owns an interest in it, the American Fruit Growers own an interest. I am particularly familiar with the packing operations at that house because I live there and I am in that house oftener than the others we have in the State. We do not use any borax in that house. I think we have less decay possibly at that house than any house we operate in the State. Possibly we handle the fruit with a little more care than it is handled at the average house. In fact, we have never used anything except just

plain water in the regular packing operation, and we never used any soap powder or anything to clean the fruit except for the water, and run it through in the regular way and have never been troubled with decay and have used very little refrigeration from that house. The oranges that we ship from that house are of a kind that would withstand decay rather better than other kinds.

[fol. 146] The groves in that section are very well taken care of and in fact the fruit is properly grown and properly fertilized.

It is my experience that a sound orange of good grade may be shipped in ventilation without decay except when the weather is quite warm. In fact, if it is handled in the grove and grown properly, it can be shipped and put in consumption with very little decay. In the years 1916, 1917 and 1918 I was associated with the Deerfield Growers Company, but I did not have charge of the packing operations, but I was vice-president of that company. The fruit was always sent to New York and we rarely had decay reported. Mr. Porcher, who was the president of the company at that time, and was a very particular man in the handling of fruit, used to pride himself on the fact that we could grow our fruit and put it in the market without ice when other people were icing. It was sounder than when people were putting it under ice. There was no preservative whatsoever. We got the top price of the market for that fruit.

In the handling of fruit, the decay is kept track of. As the cars arrive in the market most of our companies and most of the other companies have agents or representatives and when cars arrive they report the condition. For instance, if a car is sold f. o. b., when it gets through the party it is sold to and our representative inspects the car, and if there is any decay it is reported, any decay that amounts to anything. There might be some slight decay but that is not reported, but anything that would amount to anything is. And it is noted on the records made of that car when it is shipped out.

I could not say what the average time is from the picking of the fruit in Florida until it reaches the consumer in New York. The practice of most packing houses is to try, and we try, to get the fruit from the tree to the car as quick

[fol. 147] as possible—to get it to the consumer in as short a time as possible—and we do not fill our houses up with three or four days' supply ahead.

In lots of cases, like this here, when we were not moving very fast, fruit taken from the tree this morning will be on the car tonight. At all times we try not to have more than one day's supply on the platform at the packing house ahead, and in that way with the transportation we have to the market now, we get to the market in New York in five days from the time it leaves the packing house. We will allow twenty-four hours in the house, which gives it about six days to the market and then of course it is sold there and gets to the wholesalers and to the retailers in a day or so longer, so that I judge that in ten days the fruit should be in the hands of the consumer. In more distant markets it takes longer by about the extent of the longer time on the railroad. The other factors are about the same.

My attention was first called to the use of borax, I think, in the fall of 1924, when we had bulletins from the Department of Agriculture. I have no copies of those bulletins with me. I brought those with me. They were in the room. I looked for them this morning but they are mislaid in some papers, I suppose. These bulletins were just in the form of a circular stating that they would print another one later on and telling of their experiments they made with borax preserving fruit and those bulletins were sent from our Orlando office to our different packing houses that we operate ourselves or that we handle for other parties, and they were sent out without any recommendations whatever just for information for each house, and there were possibly three or four that came in during the fall and winter of 1925. The head office merely copied those and sent them around to the various packing house managers.

[fol. 148] The first borax bath was installed in our houses on March 1, 1925. In the fall of 1924 we got the first circular, but it was the first of March. In fact we heard there were quite a few more installed in the State. People are trying it out and one of our house managers decided he would try it out and he put it in the first of March and used it in one unit. Most of the houses are of two units, packing house and machinery, two units, and he put it in one unit

of the machinery and it was used possibly for six weeks in the spring of 1925.

The season in Florida is ordinarily over about in May. Sometimes there is some stuff shipped up as late as June, but the main shipping season is over. By the middle of April we are getting pretty well over the end of the season. There is some grapefruit sent up in June.

The first fruit, some of it, gets out in September; some years it is early in October before the season would really start. It is the latter part of November before we get moving good. The months of December, January, February and March and the first part of April moves the bulk of the fruit. In the other months we do not handle any shipments at all from Florida. We own nine houses outright in the State and four of those houses are equipped with borax. Four of the nine are equipped with borax.

I want to check which four those are so that I will not make any mistake. The Carney packing house is a grove that we own and it does not pack any fruit, and that one is equipped. We had a house at Maitland, which was burned last year and that was equipped, and at Cocoa. We have only used it in three houses that are equipped with using borax and one house at Haines City using one unit. That makes four houses that we have using borax. In the Haines City house we never used it but on one unit.

[fol. 149] We would make a difference in the fruit we take on the unit that is equipped with the borax and the one that is not, at Haines City. I should judge the manager would after he found that the borax was a help in preventing blue mold. Any fruit that he had coming in particularly weak that he thought it would help, he would undoubtedly run that in and use the borax. When I say "weak" I mean the fruit he thought would be subjected to decay, easily affected by blue mold.

I heard the testimony about the houses at DeLand, I believe, and Mims and New Smyrna. We own stock in those, own an interest in those houses. Those houses are owned by corporations in which we own stock. We do not own a majority of stock in any of them.

The packing of the fruit is supervised in those houses by the foreman. The American Fruit Growers supervises

the packing in a general way. We advise with them and our inspectors go around the houses and in general they use our grading and methods of packing. In a general way, we have supervision of the houses.

We market the fruit from those houses. We market fruit from other houses in which we have no financial interest at all.

There were 23 houses in all last season in which the American Fruit Growers had any interest, either as owner or part owner, or as marketing agent. We sent these copies of the Government circulars to all of these houses.

I know how many of these houses put in the borax bath. There were four houses that we owned ourselves. There were six houses that we own a stock interest in that four of thm put it in. There are three houses that we handle for that we have no interest in that are using borax, or used it last season; the season of 1925-1926. And there were two houses that we handled for but have no interest in that [fol. 150] used this Zeltrocide that was mentioned a while ago.

I do not know of my own knowledge what the composition of Zeltrocide is. I never heard what the composition was before I heard the testimony here.

I do not find the borax as we use it helps to preserve the freshness of the fruit in any way. In fact, if it was used in warm water, why, it would have the opposite tendency, because any fruit that is run in warm water has a tendency to shrink. How warm the water would have to be to cause shrinkage depends on—slightly warm wouldn't. We always try to keep it as cool as we can from the time it is picked right on to market and the fresher it comes in. For that reason we lots of times use ice when it would not be necessary to put the fruit down in the market sound, but it keeps fresher. So any fruit run through water that would be of any degree of heat, why, would have a tendency to shrink the fruit or to wither it.

I prefer, if it is possible and practicable, to get the fruit through the house and keep it as cool as we can.

We do not at the present time heat the water in any of the houses where the borax is used. We do not use hot water in any house of the American Fruit Growers whether borax is used or not.

(Plaintiff is shown sketch, introduced by Mr. Brogden, of the Haines City house, Exhibit 69, and is asked, using that sketch, to describe just how that fruit was handled from that house before the borax bath there indicated was added.)

Well, the fruit was dumped in what is marked here "small fresh water soaking tank." The fruit is dumped into that, and it went over this roller by a conveyor carrying it into what is marked "washer." Then it was carried out onto this runway that goes along to what is marked "standard [fol. 151] drier." But it went that same round before and we didn't change the methods at all except by putting pipes above the conveyor carrying it from this washer to the drier and sprinkling borax on it. Anyway, there was no change in the machinery. We just put the pipes to go from this conveyor, sprinkling borax down onto the fruit.

I doubt very much if that conveyor is over 10 feet long, though I would not be positive of that at all, because it is a thing you see often, but the actual distance I would not be sure of. But I would not judge it to be over 10 feet, possibly a little more, possibly a little less.

I do not know just what speed they have got that conveyor geared up to. In some of our houses that way where we put our fruit fast, why, it is geared up to a little faster speed; but I would not judge that fruit would be in there over a minute, passing by there, though I am not positive of that. It might be a little longer than that, but I am not positive.

(Witness is referred to the drawing showing the houses at the New Smyrna, Mims and Cocoa and asked to describe how the machinery in that house was arranged before the borax bath there was put in.)

Well, now, at New Smyrna, the fruit is dumped into the soaking tank and then goes through the washer, goes up on a conveyor through the washer over into the borax tank. We installed a borax tank between the washer and the drier. That is the only change. Then it goes into the drier and back through the regular way to the polishers and on to the grading belt in the regular way.

Now, at the Mims, we haven't got a soaking tank. It just goes on a conveyor, carried right off in the regular manner and carried into the washer, then up in the borax tank and

[fol. 152] through the same as at Cocoa. Cocoa has no soaking tank. The fruit goes right on to the washer, goes through the conveyor. That is one of the Skinner washers.

Mr. Skinner explained a while ago that some people did not approve of the soaking tank because they were not always kept clean and sometimes were a detriment instead of a benefit so lots of them cut them out. So, some houses in the State cut them out and some have them. At the New Smyrna, we have the fruit dumped into the soaking tank and then goes through the washer, goes into the water a little while and is picked up on the conveyor and goes into the washer, and then drops off of the washer into the borax tank. It is then taken over the conveyor out and then to the drier and then to the polisher in the regular way. But at Mims and Cocoa, they are the same with the exception it does not dump into the soaking tank, but it goes up on the conveyor and goes into the washer direct.

At the New Smyrna house, between the washer and the drier we had a conveyor that carried the fruit right on and we just cut a piece of that conveyor out and put the tank in. That was the only change. There was no change in the location. We just cut out a piece on the belt; in other words, a piece of the drip rack, as we call it. Where the fruit came out of the soaking tank, it was just cut out and the tank put in. That drip rack was to let the water drip off so that there would be less water to evaporate in the drier and part of that was cut out in the tank; that was all. The same condition here applies to both Mims and Cocoa. At Cocoa, the washer had to be moved back just a little as we did not have quite enough room between the drier and the washer to install the tank.

At De Land the change made in order to install the borax tank was practically the same as the others. They were put in as part of the conveyors. It was practically—just a little [fol. 153] different. We took a longer stretch there, but it is practically the same thing. It is a longer tank.

Those tanks were just put in at different places and different ways as best suited the arrangement of the machinery at the different houses so we could do it at the least expense without removing machinery in any way.

On these drawings a sort of paddle-wheel arrangement is shown, and one in the other showing Cocoa and New Smyrna. That paddle-wheel arrangement is marked a

submerger. It was put in there to carry the fruit through the tank. When the fruit comes through the tank there has to be some way of moving it across the tank on the other side on to the conveyor, to get it away; and that was put in there as a means of moving fruit across the tank.

I would say that the paddle wheel acts to submerge the fruit. What fruit it gets it submerges for a short time as it turns over and comes through. It just goes under the paddle-wheel. It is submerged and then it is pushed along the surface of the water until it reaches the other end.

In this De Land drawing, there is an arrangement shown which is designated as a submerger. The purpose of that arrangement is the same as the other, to move that fruit along through the tank. We have it on a chain there because the tank is longer and needs to be pushed; that has to be worked with a belt or chain or something, as it is turned around.

This one has a chain, a belt arrangement with paddles on it, whereas the other seems to be merely paddle wheels. They are all more or less on the same principle. Yes, this has to have a chain around it, and it turns it over and this is driven from the sprocket. The purpose of both of them is simply to move the fruit along in the tank.

[fol. 154] We have made no change in the polisher in any of these houses. They are just the same as we have always used. We have used the same method of polishing the fruit since 1919 in all of our houses.

I have got some records with me showing the decay that the American Fruit Growers have experienced at all the hosues with which they have any connection in Florida in the past two seasons. They show the total shipments from the houses we own, or own interest in, or market for in the State, for the season 1924-1925 and 1925-1926, including oranges, grapefruits and tangerines. This is a summary of our entire Florida business in citrus fruit for those two seasons.

The average amount of decay for all the fruit we are handling amounting to 4769 cars, was 94/100ths of 1 per cent for the season of 1924-1925. The decay for 1925-1926 was 85/100ths of 1 per cent. We shipped in 1925-1926 4198 cars.

The Court: This was for the whole series—that is, all that he shipped or from certain places only?

Mr. Morton: All that were shipped including all that used borax, and those who did not.

The Court: I see.

These sheets show which houses used any preservative treatment and those that did not.

We had one house in 1924-1925 that used a preservative treatment at one unit from March 1st on, that is about six weeks. In 1925-1926 the houses that used it, I have just got that checked here in our own houses, it was four. In the houses we own interest in, it was four, and two in the houses we had no interest in, which would be ten houses and there were two houses that used the Zeltrocide the last year. That [fol. 155] is, there were ten that used the borax treatment and two Zeltrocide which would be twelve houses out of twenty-three. The other nine houses did not use any preservative.

The decay figures which I have given were arrived at from reports we received from our representatives in markets showing the condition the cars arrived in.

This figure that I have given is the total per cent of decay and not merely the per cent of cars showing decay.

(Decay sheets for 1924-1925 were offered and received in evidence and marked "Defendant's Exhibit No. 1.")

(Decay sheets for 1925-1926 were offered and received in evidence and marked "Defendant's Exhibit No. 2.")

The defendant first called the borax treatment to the attention of the packing house managers in November of 1924, I think. I think I have it right here. It was October. In other words, our manager, Mr. Skelly, the manager of the citrus department in Florida, he sent a circular to our packing houses dated October 17, 1924, and he reproduced a letter that he had received from R. H. Fulton, pathologist, Orlando, and stating that they were carrying on experiments with borax:

"Experiments that we have been conducting for the past eight months show that blue mold rot can be reduced about one-half by dipping citrus fruits in a 5% borax solution at

ordinary temperatures. If the temperature of the borax bath is raised to between 115 degrees and 120 degrees F. (which temperature oranges and grapefruit can stand without injury), and the soaking is prolonged to five minutes, 90% of the blue mold rot is prevented under conditions extremely favorble for its development."

[fol. 156] He sent that to the packing houses with no comment for their information.

We received other circulars or letters from the Department of Agriculture after that which I have just read.

The office received one again in November, under date of November 22d, and on December 3d there was one sent out from the office and December 15th. There were four letters received from Mr. Fulton and they were forwarded without comment at all to our shipping and packing houses. These were all in the fall of 1924.

(The circulars just referred to by the witness are offered and received in evidence and marked "Defendant's Exhibit No. 3.")

I have observed myself the effect and advantage of icing a car or not icing it when the fruit is treated with this borax. Our observations and experiences show that it carries in the market fresher and brings in more money in most instances if it is iced, particularly oranges.

We made comparative shipments of cars that were not iced at the time we were ordinarily icing to find out specifically the effect of leaving out the ice.

We did not find that the car which was treated with borax suffered any more from decay because of leaving out the ice.

The cars carried sound. The ones in question were particularly tested out in December. In other words, the icing of course adds a cost of about 20 cents per box and all of our managers are desirous of getting the highest net return for our fruit we can and so we try experiments in that way at times. In December we prepared those experiments shipping cars of the same character of fruit the same day iced and not iced.

[fol. 157] The leaving out of the ice did affect the price that we received for the fruit.

We received, in other words, a little bit less—the amount that we received for these cars were less than the ones that were iced; and more than made up for the cost of the ice. The icing is 20 cents and in one instance it sold for 50 cents less per box and another instance 25 cents and the trade complained about it a little. The appearance was not quite as fresh.

Those cars were sold in New York in the auction.

We have made no difference in our manner of culling fruit since we started using this borax.

It has been our practice to never ship drops except in instances where the fruit was very scarce and there was a scarcity of fruit, that we have at times picked up the best of the drops and packed them separately and marked them drops, and shipped them to coast markets because my experience with a drop is that any fruit that falls any distance from the tree, or a drop in the packing house, may be injured inside and you cannot tell from looking at the fruit outside whether it will carry or not. It may carry all right, or it may be damaged, so in my opinion it is a doubtful fruit—any drop is a doubtful fruit. I do not think it is really to the best interests of the industry to ship them generally. As to my opinion as to the advantage of treating fruit so as to preserve it for more than a reasonable time to bring it to the market that is a hard question, because there are so many things to consider. There is the consumer who pays the bill. I believe he would enjoy his fruit more and be better satisfied if he felt it was reasonably fresh from the tree and had not been kept around, even if there was means of keeping it around for a month or more (though there is, as the industry is running now, in the public packing houses which we have, which have to handle fruit from groves, different kinds of groves). [fol. 158] There is weak fruit that needs help to carry it to the market and keep it long enough so that it can be good. If fruit is properly grown and properly handled, in my opinion there is really no crying need for any preservative.

The defendant is using now for this season 1¾ per cent. of borax in natural water. We are not using heat at all. We started using the 1¾ per cent. when we opened the shipping season this year, when we started to ship this season.

We sent out a circular in September, that is, before the season opens, advising that we would possibly write them later on it, but not to use it over 2½ per cent. Later, before we started the season we sent another circular out advising as to the experiments we had been carrying on, that we found 1¾ per cent. would give satisfaction, and not to use a stronger solution than 1¾ per cent.

This is in September, 1926. That covers the fall of 1926. The first one was sent out the first of September, the next one, October 12th, when we started shipping, and it was later followed up by a third bulletin cautioning them in the same thing.

(The three circulars just referred to by the witness are offered and received in evidence and marked "Defendant's Exhibit No. 4.")

Mr. Neave: Let me see those. (Inspecting same.) All right; go ahead.

The defendant has an export business in citrus fruit. The chief export—we export a few oranges, we have not yet exported many oranges from Florida, but grapefruit we are gradually exporting every year, starting in a light way in 1920, and last season is the first season we used borax in our house, and practically every car we exported last year was from houses that were not using borax.

[fol. 159] We export the fruit to England, and, in fact, we ship most to England. Of course, it goes to Scotland and others, to Paris, France, and it is scattered from there.

We ship the fruit from different points in the State. I want to amend that a little, my statement before. The Indian River fruit we ship, has been shipped entirely of the Indian River fruit, shipped over and has never been treated with borax. Some of the other grapefruit we ship has been treated with borax. I had Indian River in mind when I answered that question. Part of the fruit we have been sending across has been, of course, but all the Indian River fruit, which is the only fruit we send to France and to Europe, I mean to France, has been untreated. Part of the fruit we have sent to England has been treated and part has not.

We ship it from New York. We have at times shipped by boat from New York. We have shipped at times to

Jacksonville or shipped from Miami by boat to New York, and then boat across, but the majority of it goes by rail to New York.

Our losses from decay in that export fruit have not been heavy. They have not been heavy, though we have taken a little extra care in handling it.

The Court: Are there any oranges or grapefruit coming from the Mediterranean section?

The Witness: There are lots of oranges grown in the Mediterranean section, but not grapefruit. A grapefruit imported to England comes from the West Indies and South Africa, but South Africa fruit comes in all seasons, the season we do not have.

(Witness is shown a letter addressed to him, dated October 17, 1921, with some papers attached.)

[fol. 160] This is a letter from Mr. Brogden to me just when he was perfecting his Brogden treatment of fruit, which was the paraffin treatment, in Florida, in 1921.

The circular attached tells what the Brogdex will do for the industry. In other words, what he believes it will do in the industry.

(Letter is offered and received in evidence and marked "Defendant's Exhibit No. 5.")

Cross-examination:

I would not say that our Wabasso house packs fruit from some of the best groves which produce the soundest fruit of any in Florida. They are very good groves in Wabasso. They are better than the average. The fruit that they pack there is grapefruit, oranges and tangerines. There is, I would say, close to two-thirds grapefruit and the others being oranges and tangerines.

The Wabasso house is not completely owned by the American Fruit Growers. It is a partnership, that house is a partnership between the American Fruit Growers and the Deerfield Groves Company, which are affiliated companies.

We completely own the plants at Haines City and Cocoa and at two other places. In other words, we completely own a packing house that we call our Carney Grove, Car-

ney packing house, one at Palm Harbor, one at Crescent City, one at Maitland, which has burned down, and one at Lake Gem, and one at Haines City, and one at Cocoa, and one at Vero Beach, and one at Fort Pierce.

In the Haines City house and the Cocoa house and two others of the houses that we completely own we are using the borax treatment.

[fol. 161] Those installations were made—in the Maitland house we made installation on one unit in March, 1925, and that was used part of that season, 1924-25; the others were made in the fall of 1925, so that it would be the season of 1925-26 we used it. It was in the summer and fall; I really just do not remember when it was in. It was put in, I think, in time to open the house for the shipping season.

In Haines City we pack for different growers. At Cocoa we own some fruit and we pack some from our own groves and the other fruit is from other growers and numerus groves. Maitland, the same condition exists. We do not own any groves at Maitland except one small grove that did not amount to very much in volume, and that is packed from different growers.

The fruit that is packed in the Wabasso house comes from, possibly, we would say from between 50 to 75 groves, but about one-third of it comes from one series of groves, the other two-thirds comes from numerous groves.

Referring again to the fruit that is packed at Haines City, at Cocoa and the other two houses that we own and in which we use borax, the different kinds of fruit shipped is shown on the tabulation exactly by the number of cars of each variety from each house. It is also shown on that same sheet what the five other houses that we own pack and the amount of their pack. Everything we pack in the State shows, the exact amount in cars and the different variety.

Our houses at DeLand, Mims and New Smyrna are packing houses that are not owned completely by the American Fruit Growers, but are incorporated companies in which the American Fruit Growers owns some stock and the American Fruit Growers supervises and directs the operation of those plants. That is practically so.

[fol. 162] For these plants in which we have an interest and supervise the operation of, we buy the machinery.

When the borax treatment was installed in the DeLand, Mims and New Smyrna houses we bought the additional equipment that is necessary for the borax soaking tank and so forth. The management had it installed. Our purchasing department bought it at the request of the management of the houses. The American Fruit Growers, who purchased it, knew what it was going to be used for.

The American Fruit Growers buys the borax for these houses which we do not own but the operation of which we supervise. It knows what these houses will use it for.

In March and April, 1926, we were using a borax solution at the Haines City house. I do not know exactly what the strength of solution was. The bulletins were sent out to the packing houses and it seemed to be the opinion of Mr. Fulton that 5 per cent. was the most effective. I think they all had 5 per cent. in their minds, but our way of applying it possibly was a little crude, and the way it was appled there, the fruit came over the washer and the fruit was wet and then it went off into the dryer and when it went on the drip rack it carried a certain amount of water with it and it carries a certan amount of borax so that the water was always being diluted in the tank underneath the floor with fresh water. So to keep it at 5 per cent. strength it would be necessary to watch it very closely. In most of our packing houses, my observation is that it was not watched very closely, and while it was the intention to keep it around 5 per cent., the actual practice was in most instances considerably under 5 per cent.

And it may sometimes have been over on account of being called to their attention sometimes which I did, that it was considerably under that when they charged up they [fol. 163] may have charged over and times enough to allow for some of this. What I have just said applies not only to Haines City but to the other houses that we own and in which we used borax and also to the houses that we did not own but the operation of which we supervised. In those houses on March and April of last year I could not say how often was the borax added to the water. It was entirely up to the manager there. I do not know personally anything of the directions as to that. At the Haines City house in March and April, 1926, they made an attempt there, as I understand, to apply the solution warm. In other words, I think their original intention was to try and

get it around one hundred, though I doubt in very few instances they succeeded, because the cool water was being dripped coming over the fruit, coming off of the washer with the cold water on, and being in the air, I doubt very much whether they ever had it one hundred or anywheres near one hundred for an average.

They were trying to get one hundred, and at times their outfit was not working, and they did not try at all. But they did try in all the houses or it was understood that if the temperature of the water was below seventy degrees the borax would not stay in solution and so they made an effort to keep it above seventy, although the first part of the season there was very little effort to keep it at any higher temperature. If it was above seventy they thought they were getting some benefit.

All of these houses had some means of heating the solution. In the Volusia house at DeLand, which was the plant in which there was a very long soaking tank with the borax solution in it, there was a long belt above that with a number of paddles. It may be a strange thing to say of somebody like myself watching the general observation [fol. 164] of the house at the time, but I am more interested in the grading and packing and the general work and the borax thing has been more or less of a side line and I did not pay much atention to it. I have seen that tank several times, but that is one of the tanks that I did not give any particular attention to the method, but all the tanks that were used had a paddle wheel that I observed submerged the fruit as it pushed it along.

In the houses in which we did not use borax, we did not use any paddles for bringing the fruit through the tanks. We did not use the borax tank then. We used some soaking tank. The fruit itself pushed itself up. The sheet that I have put in evidence shows which of the houses use Zeltrocide. None of the houses that we own use Zeltrocide. None of those, the operation of which we supervise and direct, use Zeltrocide. The Zeltrocide is used only in two houses that we market for. I have not been to those houses since they installed this treatment.

I have myself personally certain houses that I watch closely, and those houses are a little bit out of my territory and are looked after by someone else and I have not been in either one of those houses since the Zeltrocide was in

stalled. We sent out some bulletins that have been put in evidence as Defendant's Exhibit 4, with reference to the strength of the borax solution that was to be used. They went to all packing houses that we owned, owned an interest in and that we market for as well as the men that work in the field. I do not know what strength of solution of Zeltrocide those two houses were using.

There has been no attempt whatever to warm water this year. By this year I mean this season from October, 1926. Last season there was an attempt made to warm the wafer particularly if it got below seventy.

[fol. 165] I cannot tell you from whom we received information that the Government authorities had found a solution of 2½ per cent. of borax effective. That was sent out by Mr. Skelly, the manager, and I do not know where he got it from. I do not know that such information was actually received.

I think one man who was connected with some of these experiments stated that he believed that less than 5 per cent would be effective. That was just conversation.

When we stopped using any warm water at these houses of ours, and when we reduced the strength of the borax solution, we made no changes in the apparatus except we are not attempting to heat the water. In other words, the same procedure, the fruit goes through just the same as it did last year, with the exception that we are making no attempt to heat the water and the solution is weaker.

At the Cocoa house we did install another polisher between the drier and paraffin polisher this past year. That was a change in the house, but had nothing to do with the borax.

There are changes made in our packing houses every year, more or less some changes in the machinery and replacements and regrouping, and it is of considerable expense attached to a packing house every season in replacements and small changes that the managers wanted to make. At Cocoa there were additional polishers installed this past year for the reason that they thought they would get a better polish on the fruit using the same borax tank.

According to these bulletins, the instructions or advices went out to our packing houses to use a borax solution of not over 2½ per cent. or 1¾ per cent.

I have tested it in three or four of our houses and at Cocoa, Mims and New Smyrna, and in no instance when I tested [fol. 166] it, did I find it quite $1\frac{3}{4}$, and in one instance I found it $1\frac{1}{2}$. I did nothing. I just called it to their attention, that is all. I do not know how high they raised it then. I have checked up possibly four or five times this season.

I have produced here no figures of our decay for the present season. That extra polisher was put in at Cocoa sometime last summer, I think. It was before the shipping season started this year.

None of the houses forwarding us marked fruit use any brand other than "Blue Goose" or any other brand of the American Fruit Growers. There may be in some houses, but in none that we own an interest in or own ourselves.

In fact, I think some of them do take some other brands though I could not be positive in knowing just exactly what amounts, and at times we have packed other brands in our houses for some outside party that had some fruit going, to pack it under a special brand. Then we branded it with that name, their brand.

The American Fruit Growers buys its borax from the Pacific Borax Company, I think. I have not given any figures on decay in the export shipments. The figures on export shipment are included in these shipments here. They are all included.

Now these figures here that I am speaking of, that is, that large sheet I put in evidence, shows only our Florida operations. We pack in California also.

I do not know how much royalty is paid for the use of Zeltrocide by those two houses that you refer to.

I do not disagree that the blue mold decay was an extremely serious problem. It is a problem. It is just one of the problems that we have with our citrus business. We minimize the decay in some instances by growing good fruit, that is, going way back to the beginning—growing good fruit [fol. 167] and by extra care in handling, packing and shipping and picking, and in some instances by use of borax.

As I said, I think if our fruit was grown properly and handled with reasonable care, we would not need anything of the kind, but as some of it is not, it is of benefit, and it is shown it is a benefit, and our experience shows it is a benefit. Borax is a benefit on weak fruit.

The figures that I have presented here do not show the percentage of cars in which decay occurred. In checking those figures over with Mr. Derby, the head of our accounting department, I found in fact sometimes it occurs in just a few cars. For instance, we will take this Winter Haven house which we do not own. They shipped last year 510 cars with borax. In checking that over with him, I found there were 155 cars of oranges, 141 of those were sound, no decay whatever. The other fourteen showed an average of 8 per cent. decay, which brought it down to 7.2 of 1 per cent. oranges, or decay was in fourteen cars and in chasing this through, and I think every other shipper, if he handles this business, will find his decay is in only a small number of cars, picked under adverse weather conditions, so we have a practice in Florida of selling the stuff after it is rolled, if the market is weak there is a tendency for the manager to hold the fruit, and sometimes it is three or four weeks traveling around the country finding a home. Those are the cars we have serious trouble with; and in checking them over, this house of Winter Haven shipped with borax, one car that showed 39 per cent. of decay, another car showed 27 per cent. with the use of borax, and that same thing has occurred in other cars that did not have borax in.

In the particular cars the use of borax did not enable us to hold the fruit longer, or let it wander longer, before it went to the ultimate purchaser.

[fol. 168] But I would say with the general experience that we have had that it does have a tendency to help in some instances, it does not look like that, but still that is the exception to the rule, I believe. With this fruit that we have exported, we did not export that under refrigeration. In other words, we have even rolled it to New York by boat and then put it across in very good condition. Now, first, they put it no doubt in storage when it gets there, and at times they may put it in storage on the boats, that is entirely up to the other end. We roll it on either by boat or with ventilation in most cases, though late in the season when the fruit was dead ripe, we have rolled some to New York for export under refrigeration. In other words, so far as blue mold, in these

figures, all kinds of decay is taken into consideration, and these figures show that in lots of instances, our grapefruit we have more decay in that than with oranges.

Confining our attention to blue mold decay for a moment I would say that it is more likely to attack oranges than grapefruit. But those decay figures are taken for all decay. The other kinds of decay besides blue mold are stem-end rot, and the fruit can be bruised or be pressed in boxes, causing decay, breaking down the cells, which is a large portion of our decay in the markets, oranges, grapefruit and tangerines, a lot has possibly been caused by blue mold itself. In other words, I think it has got the credit for a whole lot that it is not entitled to.

The tangerines that are shipped through are a small proportion of the tonnage. I could not say how the fruit that was exported was handled. We sold this fruit f. o. b. New York and it belonged to the other man when it got to New York.

We sometimes have to hold fruit that we pre-color, in the early part of the season to a limited extent. We have [fol. 169] held that until we can get the color out of the orange or grapefruit. It means anywhere from 36 to 40 hours, rarely we hold it over 48 hours, though in some instances longer than that. Most of our pre-coloring, at least the heaviest we have, is at our Carney Grove, which is a portion of the grove owned by ourselves, and we color more at that house though we color some at all the houses.

At times of weak market in commercial practice, the cars do wander around finding a purchaser. We think we are going to sell it in one place and then it has to be diverted to another market.

Most of this that you found in our biggest decay was in second quality fruit that is hard to sell. In other words, at each house we will say we will have a brand for first quality and for the second quality, most of that decay occurred in fruit of second quality; in fact, it was not quite up to the standard when it was packed.

In practice our fruit does not always get to the ultimate consumer within ten days from the time it is picked from the tree. A good proportion of ours does, I believe, because the larger portion of our shipments are rolled direct,

or nearly so. In this DeLand packing house of ours, where we have the 30-foot tank holding the borax solution, through which the oranges may be brought slowly, so that they are in there a good while, I am not sure why it is we have such a long tank.

I never discussed that with Mr. Chapman or paid much attention, but I assume he had this space there that he could utilize, because in most places we have them in, we had them in the space we could utilize to the best advantage.

We take rather a pride in trying to ship only the soundest fruit, and freshest fruit we can get hold of. That is [fol. 170] commercial and to keep business, we have to take fruit of all kinds.

The American Fruit Growers owns or operates some packing houses in California. It ships to the Eastern markets. I have nothing whatever to do with that business. I know very little of the details.

I do not know exactly how long it would take for a carload to get from California to New York, but it would take considerably longer than from Florida because it is three times the distance. It takes five days for a car to get from Florida to New York; to Chicago one day longer, and from Boston the same proportionately. That is considerably longer of course.

Redirect examination:

In those houses that the defendant owns an interest in, and where we bought the machinery and purchased the borax, the American Fruit Growers bill it to the particular house which buys it. We act as purchasing agents for them. We have an organized Purchasing Department that takes care of that for them.

ALBERT H. MORGAN

ALBERT H. MORGAN, of Rialto, California, called as a witness on behalf of the defendant, testified as follows:

Direct examination:

I am a fruit grower, packer and shipper. I own an orange grove myself. I have 157 acres in my grove. The market value of that large grove is about $350,000. I refused $300,000 for it. That size grove produces on an average year from 60 to 75 cars of fruit. As a packer I am manager of the Rialto Heights Association, which is a [fol. 171] member of the San Bernardino County District Exchange affiliated with the California Fruit Growers Exchange. Our house is what they call a regular Exchange house. I own an interest in that house.

The yearly output of that house is about 125 to 150 cars. Last year we shipped 192 cars which was our largest season. I take my own fruit from that house. The rest is the fruit of other growers in the vicinity who are members of the Association. I have been operating as manager for this particular house since 1916. The house was built in 1916. It has been operated ever since it was built. I have been a packing house manager for the last 26 consecutive years.

The house which I managed before the one which I am now managing was located right adjoining it. Within a few feet of the present house. These houses we rented or leased from another owner.

By "we" I mean the Rialto Heights Association, of which I am manager. In packing our fruit, the fruit is brought into the packing house and then it is put on a conveyor, an automatic conveyor, and taken up to a soak tank and from the soak tank into the brushes dried and then it goes to the sorters and from there down to the sizers and the packers. We use borax in our soak tank. We use about ten pounds to a car. We run eight hours a day and we put five pounds in the tank in the morning and five pounds at noon, or one o'clock. We resume operation after lunch. Our soak tank is about ten feet four inches long and about three feet eleven and a half or four feet wide and about fifteen inches deep. I measured it to determine those measurements the day I started down here. I do not know the exact number of gallons of water in the tank, somewheres between 175 and 200. We fill the tank up within about six inches of

the top and we have a mark which is about eight inches [fol. 172] and a half from the bottom of the tank and we fill it up to that mark. We change the solution in the tank every night. We drain it out every night and clean the tank, yes. We have been following the practice which I have just described since March, 1916. We have made no change in it in that time.

My attention was first call to the use of borax in the soaking tank along about 1911 or 1912. There was an English tourist in the house and I was examining a box of oranges in the old system that we used to have, when we shipped a carload of oranges we kept a box or half a box to determine the amount of decay. The reason we did that is because the buyers in the East would report a certain amount of decay and we wanted to have a check on them. I was sorting this box over and making my notes and this tourist came up and said: "What are you doing there, my lad?" And I said, "I am checking up the rots in this box." He said, "I think I can tell you how to save that," and I said, "How?" He said, "In the old country where I come from we use borax and we have very few refrigerators, and we use borax to preserve our meat." He said, "I think you can do it with oranges if you sprinkle it on there."

We did start using the borax right away after that suggestion because we were not washing the oranges in those days, but when we built the new house in 1916, we installed the washer and the heater and every once in a while when I would have a car with a lot of decay, that remark came to me that perhaps borax would stop it and I would plan, whenever I would go to a house I would put in a soak tank and a heater and use a borax solution to see if I could prevent this decay. We heat the water in the soak tank.

We have a little—we used to use a distillate burner and now we are using gas, but up until a year ago we used [fol. 173] a distillate burner with a coil pipe, a regular water coil, and a circulating pump, we have a little pump that would pump the water around through this coil into the top of the soak tank or within about four inches of the top and then it would return through an opening in the bottom and we would keep that water circulating under this fire all the time or above this fire all the time.

We pack about a carload of fruit a day, sometimes a little less and sometimes a little over.

I think the use of borax retarded my decay. I have no figures on that. In 1914, 21 per cent of the cars showed decay, and in 1915, 18 per cent of the cars showed decay. We installed this borax tank in 1916, and in 1916 I had 8 per cent of the cars showed decay and 1917, 10 per cent, but my average for the ten years up to the finish of this last season, my total average of per cent. decay is a little less than one-half of 1 per cent. for the ten years, that is actual decay. That is actual percentage of decay as distinguished from the number of cars that show decay.

The Exchange keeps records of decay from all houses and these records are available to any member of the Exchange. They are sent out each month to each district of the Exchange and to various associations. Each one of the packing house managers gets a copy of the price that all of the members of the California Fruit Growers Exchange have received from their fruit for that month together with their percentage of decay.

We get a memorandum of the price as well as the decay. At the end of the season we get season's average f. o. b. per box of all fruit shipped of the different varieties. There is considerable rivalry among the houses to see who can get the f. o. b. price. That is about the only outdoor sport we have—trying to beat the other fellow.

[fol. 174] The f. o. b. return means the amount of money that is returned from the buyer to the California Fruit Exchange head office in Los Angeles, California, and that is representative of what goes to the grower.

These houses are co-operative. All houses in the California Fruit Exchange are co-operative and it is a non-profit organization.

Our fruit has ranked exceedingly well in the last few years compared with the fruit from other houses in price, f. o. b. price.

The Rialto Heights Association has made the highest average on Washington Navels, for six consecutive years that is, in the Sacramento County District Exchange, and we have made the highest average for Navels in the State of California this year and the year before last, twice within three years. We have made the highest f. o. b. average

on Navels in the State of California, this particular association of which I am manager.

The Exchange has rules in regard to grading and culling the fruit which the member houses must observe. The California Fruit Growers Exchange have what they call a graders committee. This committee establishes a certain grade under which we can sell our Sunkist brand and our other brand, the Red Ball brand. They have a department called the Field Department and they have a number of deputies who go out to the packing houses and instruct and show the various managers what that grade shall be and keep it up to a certain grade, but they allow in that a tolerance of 5 per cent. The Sunkist grade will be an orange that must be of good shape and good color with a certain amount of scars on it and then they hold that as a standard and then they allow the various packing houses to go to that 5 per cent., that is, a 5 per cent. tolerance below that.

[fol. 175] When I referred to scars, I mean clipper-cuts and injuries to the fruit. They allow 5 per cent. on that but we try to keep that out but it is impossible to keep all of it out and that is the reason we made this tolerance of 5 per cent. We are supposed to take all this out. They will allow as much as 5 per cent. of clipper-cuts and that sort of thing. You cannot get them all out and that is the reason why we made this tolerance of 5 per cent.

Those rules of the grading committee have not been modified in any respect since this borax use by the Exchange has become more or less general. All we packing house managers try to ship all the fruit we can and still stay above the tolerance. I might add the reason we do that is that the more fruit we ship, the greater volume that we ship, the smaller our overhead and the more money we will be making.

Our packing house foreman when we first started using this borax in 1916 was George Woodburn. He was with us about two seasons, I believe; three, maybe. I think a fellow by the name of W. S. Farmer succeeded him as foreman. He was with us a couple of seasons. George M. Wood succeeded him.

In making up the borax solution the foreman usually actually put the borax into the water himself, the house foreman. He did not make up the solution. He just

dumped the borax into the tank. He put the crystallized or powdered borax right into the tank. He did not mix it up into the water and then pour that in.

Wood is no longer with us. He left about 1920. He was with us at two different times, I think perhaps two seasons.

We have a packing house foreman now. He has been with us for four years, four seasons.

Besides the packing house foreman I do not think anyone but myself has put the borax in the water. I have done that myself sometimes, between the times—I would [fol. 176] have a foreman or at the end of the season I would not attempt to break in another foreman, but I would do that work myself, that is, I would see that it was done by some of the boys there. I would have added the borax myself.

I did not at any time tell these foreman not to disclose the use of this borax to any one. I never made any effort to keep it secret at all.

We sell our culls locally to some of the people in the nearby towns. We do not pack any culls.

For the first few years until up to about 1922, I purchased the borax from a home store there of C. W. Reisenger and then after that we bought the greater portion of it from Madden and McDonald who bought out the Reisenger store and once in a while when we would run out we would buy some little amounts from other stores to carry us over for the time being until last season we bought it from the Pacific Coast Borax Company, I believe it is.

It came in package form from the store. He made me nearly a wholesale price on it within a cent or two a pound above what it would be if I took it in a carload lot or wholesale lot. It came in cases, I think, 100 pounds a case or some of them fifty pounds a case. They were not always five-pound packages. Some packages I think were two-pound packages. The majority of them were five-pound packages, and some of them were two pounds.

We get it by the ton now, that is, as the carload is shipped in we get a carload rate and it is divided up among the various packing houses and we take a ton and we get a much cheaper rate if we take a ton.

We buy it directly from the agent of the borax company, but it is billed to the Fruit Growers Supply Company,

which is the purchasing department of the Exchange. That arrangement for purchasing borax has been made, I think, in the last two years, or seasons.

[fol. 177] I said we put in borax in the morning and also at noon. I imagined then and still do that this fruit coming through the water would leave off a lot of foreign material and I thought it would lessen the strength of the solution. The fruit goes into our tank dry and it takes out some of the solution on the orange when it goes out. The water level falls in the course of half a day perhaps an inch, not more than that, sometimes half an inch.

The fruit goes after it leaves the borax tank to a cylinder washer; it has four round brushes about ten or eleven inches in diameter, the four of them, which makes three grooves for the oranges to go through and it goes through the tank into a little conveyor and then into this brusher and then out into the dryer.

We do not put any fresh water on the orange after it leaves the soak tank but we use above these brushes, we have a pipe leading along, a drip pipe, that we use for cleansing out the brushes and the frames, and when we are running these oranges we let the water, just a slight drip to the brushes to soften them but not to rinse the oranges. We try to leave as much of the borax on the oranges as we can.

I said that machinery was now just like it has been since we first installed it. We have what is called a Turkish towel polisher. I do not know if it polishes or not, but it is supposed to be.

The only change we have made is, I believe, last year we put in a new galvanized iron tank. We used the same frame, but dropped in a new tank in the soak tank and it is made of galvanized iron and set in a frame 2 x 4. We took out the old tank last year and dropped a new tank in the same tank. There is no change in the dimensions of the tank. It is the same sized tank. Otherwise our equipment is just the same as when installed in 1916.

[fol. 178] Cross-examination.

By Mr. Neave:

X Q. 88. I did not quite understand about that washer, Mr. Morgan. In the washer which is beyond the soaking tank there are four cylindrical brushes, are there?

A. That is right.

X Q. 89. And each brush is how long?

A. Six feet long.

X Q. 90. And those four brushes lie side by side and extend inclined away from the soaking tank?

A. A drop of about two inches.

X Q. 91. Two inches in the six feet?

A. From where the oranges enter the brush until they come out.

X Q. 92. What is there just under those brushes?

A. Nothing, just a space.

X Q. 93. There is a tank there, is there not?

A. I do not know if you would call it a tank. It is a tin drain to catch all the dirt and water that comes through there and the borax to keep it from going on the floor.

X Q. 94. Does the water collect underneath the brushes in this tank, underneath the brushes?

A. Not much, mostly dirt, a little water.

X Q. 95. Are your oranges dirty; I mean are they very dirty and do they need scrubbing?

A. No, we have very little scale out there.

X Q. 96. But you get dirt underneath the brushes in the pan?

A. A certain amount and a certain amount of the bristles that come off the brushes.

X Q. 97. And all the time that the oranges are coming through, you are spraying water on the oranges and brushes?

[fol. 179] A. No, we do not spray any water on the brushes or oranges. We have the pipe over the brush and drip just sufficient on there to keep the brushes soft, not to bruise the oranges and at the same time not to take off any more of the borax solution than we have to.

X Q. 98. And that was the condition in which the apparatus was installed in 1916?

A. Yes, sir.

X Q. — And you have no drawings of the apparatus here?

A. No, I have not.

X Q. 100. I did not understand either as to just how you put your borax in. This soaking tank as I understand it, is filled with water up to a line about eight and one-half inches from the bottom?

A. Correct.

X Q. 101. And when you get that much water in you have about 175 to 200 gallons?

A. Something like that.

X Q. 102. And then you start it in the morning with the fresh water, and put five pounds of borax in?

A. Yes.

X Q. 103. And at noon, one o'clock, you put five more pounds in?

A. Yes.

X Q. 104. And when you put in the additional five pounds at noon, do you add more water?

A. Yes.

X Q. 104a. How much?

A. It would bring it back up to the level sometimes an inch and sometimes half an inch. At some times the oranges take out more water than at other times. If they are coarse, they take out more water than when they are smooth.

X Q. 105. Did you always use these same quantities of borax?

[fol. 180] A. Yes, sir.

X Q. 106. Ever since 1916?

A. Yes, sir.

X Q. 107. You have said that from your house here you pack about a carload a day?

A. About. Sometimes a little more, and sometimes a little less.

X Q. 108. When does your season begin?

A. We started along December and ship a few cars, a very few, and then a few months until June.

X Q. 109. And how many cars have you shipped since December, 1926, to date?

A. This season?

X Q. 110. Yes.

A. I would say fourteen or fifteen cars maybe, I just do not remember exactly.

X Q. 111. Have you any of your books here?

A. No, I have not. What do you mean by books?

X Q. 112. Any of your books or records of your exchange?

A. No.

X Q. 113. When did you come on from California, Mr. Morgan?

A. One week yesterday.

X Q. 114. And when you left there you knew you were going to testify in this case?

A. Yes.

X Q. 115. You came for that purpose?

A. I did.

X Q. 116. And you brought none of your books or records with you?

A. I have a little memo book here, but no records; I do not know what you mean by records.

X Q. 117. I suppose that you would have, your association, or whatever you call it—is it an association or an exchange?

[fol. 181] A. It is an association member. It is an exchange association.

X Q. 118. Your association has some books of account, has it not?

A. Surely.

X Q. 119. And something that shows its shipments?

A. Yes.

X Q. 120. And something that shows its purchases from time to time?

A. Yes.

X Q. 121. And has had for the last ten years ever since it organized?

A. Yes.

X Q. 122. A good many books of that character?

A. Yes, it takes up quite a little.

X Q. 123. What number of cars did you ship in the season of 1925 to 1926?

A. The season just finished?

X Q. 124. I suppose the season finished last July.

A. One hundred ninety-two. That is figuring 400, as we count our shipments in California, 400 boxes per car that is how we make our annual reports.

X Q. 125. In 1924-25 what were your car shipments?

A. One hundred eleven.

X Q. 126. And in 1923-24?

A. I would have to refer to that little memorandum book.

X Q. 127. Where did you get that memorandum from?

A. This particular book, that was given to me.

X Q. 128. Where did you get the information that is on the inside of the book?

A. I took it off my records just before I left.

X Q. 129. And did not bring any of your records?

A. Just this little memo off the records.

[fol. 182] X Q. 130. And you testified in California in this case?

A. I did.

X Q. 131. And gave a deposition?

A. Yes, sir.

X Q. 132. And you were asked for your records, were you not?

A. No, not particularly of the records. Some particular shipments, and these are only memos pertaining to these particular things I was asked at that time.

X Q. 133. Take 1923-24, what were your shipments?

A. One hundred eighty-eight cars.

X Q. 134. 1922-23?

A. Seventy-six.

X Q. 135. 1921-22?

A. One hundred eighteen.

X Q. 136. And 1920-21?

A. I have not that. I just took for six seasons.

X Q. 137. 1919-20?

A. I have not that.

X Q. 138. You have not any back of 1921 to 1922?

A. Nothing. I just took off the six seasons.

X Q. 139. What is the total number of cars that you have shipped since 1916?

A. I can give it to you in boxes, 570,373 boxes.

X Q. 140. Where did you get that?

A. Off my records.

X Q. 141. You have your records then?

A. Oh, yes.

X Q. 142. And were all those treated with borax?

A. Every one.

X Q. 143. In just the way you have described?

A. Yes.

The Court: We will take a recess now until two o'clock.

[fol. 183] After Recess

By Mr. Neave:

X Q. 144. Mr. Morgan, you have given the total number of boxes of oranges which you say that you shipped from 1916 up to what date, up to the close of the last season?

A. To the end of the 1926 season.

X Q. 145. To the end of the 1926 season?

A. Yes.

X Q. 146. And there were 400 boxes to a car?

A. That is the total number of boxes.

X Q. 147. Yes, and how many boxes were there to a car? I want to change that into cars.

A. We would make our annual report, the California Fruit Growers Exchange figure on a basis of 400 packed boxes per car.

X Q. 148. Yes.

A. And our cars are actually 462 boxes.

X Q. 149. Then in order to translate this into cars, should I divide it by 400 or 462?

A. To be actual, 462.

The Court: All your other calculations have been on the 400 basis, have they not?

The Witness: Yes, sir. That is the way we determine our yearly output, the number of cars as 400 boxes per car, that is the usual form in California.

X Q. 160. You spoke of an Englishman coming to you at one time and talking to you on this general subject matter; what is the name of that Englishman?

A. I do not know.

X Q. 161. Have you seen him since?

A. No.

X Q. 162. Never seen him before?

[fol. 184] A. No. He was just a tourist going through, looking at the packing houses.

X Q. 163. You have stated this morning that the dimensions of your soaking tank were 10 feet and 4 inches long, 3 feet, 11½ inches broad, and about 15 inches deep; is that right?

A. I have the figures here——

X Q. 164. Is that right?

A. That is about right. I have the actual dimensions here, I took from the tank before leaving.

X Q. 165. State the actual dimensions again.

A. Inside measurements 10 feet, 3 inches long, 35½ inches wide, 14½ inches deep.

X Q. 166. How wide, repeat that, will you?

A. 35½ inches wide.

X Q. 167. It is less than three feet?

A. Yes, about half an inch less than three feet.

X Q. 168. And you testified this morning it was four feet wide; where did you get that figure?

A. Well, I must have been wrong. Those are the dimensions I took off the tank myself. Did I say 4?.

X Q. 169. You said about 3 feet 11½ or 4 feet wide?

A. That is wrong if I did. It is 35½ inches.

X Q. 170. Now, ever since 1916, have those been the dimensions of length and width?

A. Yes, sir.

X Q. 171. And also ever since 1916, the tank has been of the same depth?

A. Just the same.

X Q. 172. And is it of the same width and length all the way down, that is, it is a square all the way down, or tapered down to the bottom?

A. Square.

X Q. 173. Square all the way down?

A. Square all the way down.

[fol. 185] X Q. 174. Did you have some board extending across the top near one end at an angle?

A. Yes.

X Q. 175. How far down did that extend into the tank?

A. I think about three or four inches from the bottom.

X Q. 176. What was that for?

A. To keep the oranges—might I explain?

X Q. 177. If you will.

A. The water circulates and comes around a centrifugal pump and comes around the tank about three or four inches from the top and is taken out from the bottom and this eddy that it would naturally make, the oranges coming in on a conveyor belt into the tank, some of the orange would eddy back until a man would take them out because they would stay there, and I put a board across there so

that they would each in turn feed out. Before some of them would stay there about an hour or an hour and a half and I do not think it was any good for the orange, and I put this board in to take them out.

X Q. 178. Force them out in the direction of the conveyor that took them out into the brushes?

A. Yes, sir.

X Q. 179. And how long did the oranges stay in the water?

A. Perhaps two and a half or two minutes, perhaps one and three-quarters to two and a quarter. Every orange does not come out in the line that it comes in.

X Q. 180. Did you ever time it?

A. Yes.

X Q. 181. When?

A. I cannot say just when, when I installed it.

X Q. 182. Within the last two or three weeks?

A. No.

[fol. 186] X Q. 183. Within the last month or two?

A. No, I do not think I have timed it within the last season.

X Q. 184. I understood you to say just a moment ago that this water in the tank was circulating, is it pumped in and out?

A. Yes.

X Q. 185. Where is it pumped from?

A. About 40 feet or so from the tank we have a little motor and it sucks the water or rather the water comes out from the bottom of the tank and goes through the heater and is pumped back into the tank and is circulated all the time to keep the temperature.

X Q. 186. How far away is that pump from your tank?

A. I should say 30 or 40 feet.

X Q. 187. And it has always been that far away?

A. Yes.

X Q. 188. And what size of pipe leads from the pump to the tank?

A. Three-quarter inch pipe.

X Q. 189. Three-quarter inch back and to the tank?

A. Same size all around.

X Q. 190. Same size inside?

A. I really do not know.

X Q. 191. What is the form of the heater?

A. It is a copper coil.

X Q. 192. And where is that with reference to the location of the pump?

A. About four feet west of it.

X Q. 193. Four feet further away from the tank?

A. Yes.

X Q. 194. And that is connected with the three-quarter inch pipe at the pump with three-quarter inch pipes also?

A. Yes, sir.

[fol. 187] X Q. 195. What are the sizes of the heater coils?

A. I could not tell you exactly, they look to me like they were probably an inch and a half or two.

X Q. 196. What is the length of the heater coil?

A. I really could not tell you.

X Q. 197. It is more than a foot I suppose, is it a coil going back and forth a number of times?

A. It goes around. The heater is I guess about two feet across and the pipes make 10 or 15 coils in there a few inches apart.

X Q. 198. And what is the heat that is applied?

A. We are using gas now.

X Q. 199. Inside of this nest of coils?

A. On the bottom of the coils.

X Q. 200. Coming back to the soaking tank, how deep does the water stand in that tank when you fill it up?

A. Before we put the oranges in?

X Q. 201. Yes.

A. About eight and a half inches.

X Q. 202. About eight and a half inches from the top or bottom?

A. From the bottom, leading up.

X Q. 203. And the tank is how deep?

A. Fourteen and a half inches, I believe.

X Q. 204. You said this morning that you filled the tank up within about six inches from the top?

A. Yes.

X Q. 205. That would make a depth of about eight and a half inches?

A. Yes.

X Q. 206. And that is where your mark is, eight and a half inches from the bottom?

A. Yes.

X Q. 207. This form of heater, and this arrangement of pipes running from the tank to the pump and the heater [fol. 188] is that the same thing that you have used continuously ever since 1916?

A. It is.

X Q. 208. Same size of pipes?

A. Same pipes.

X Q. 209. These brushes that you were speaking of, have those always been the same from 1916 on?

A. No, we renew them every year.

X Q. 210. Every year?

A. Every year.

X Q. 211. But they are the same in size and shape and structure and arrangement, are they, that they have been from 1916?

A. Practically the same.

X Q. 212. You say practically. What reservation have you there?

A. I never measured them. I imagine they are within half an inch or an inch. They may deviate an inch or half an inch and they fit the washer and we order the same brushes from the same people and they come and put them in.

X Q. 213. In this water in the soaking tank, do you use washing powders?

A. Once in a while when we have a lot of dirty fruit.

X Q. 214. And you have done that all the way back to 1916?

A. Yes.

X Q. 215. And how often have you used that washing powder, how continuously?

A. Just how do you mean?

X Q. 216. Did you use it every day or once a week?

A. No. It all depends; sometimes we would run two or three weeks and never put any washing powder in at all. Other times we would put it in every day.

X Q. 217. When the fruit is dirty?

[fol. 189] A. Yes.

X Q. 218. What kind of washing powder did you use?

A. Different kinds, sometimes "clean made" washing powder and sometimes the washing powder called citrus, "Gold Dust Twins," whatever we happen to buy in the stores.

X Q. 219. Where did you get the washing powder?

A. Different stores.

X Q. 220. Can you name any?

A. Yes, some at Reisenger's store and some at Downing's store.

X Q. 221. Any at Needham's store?

A. It is possible, I do not remember getting any. When the foreman sends the boy out he goes to two or three stores until he does get it.

X Q. 222. As I understand your testimony, from 1916 to the present time you have always been using the borax in substantially the same way as you have described?

A. Right.

X Q. 223. You are one of the associations affiliated with the California Fruit Growers Exchange, are you?

A. Yes.

X Q. 224. Do they send inspectors around?

A. What kind of inspectors?

X Q. 225. Inspectors to inspect your plant?

A. No.

X Q. 226. None of their inspectors ever come into your plant?

A. Oh, yes, they inspect the fruit but not the plant. They are supposed to go into your packing house, in fact, one of the growers that established this grading committee and employed these inspectors and we employed Mr. Ramsey as the chief and he has various deputies and their specific business is to go to the packing houses daily and sometimes [fol. 190] more than that, whenever we are running and inspect the grade and pack of the fruit.

X Q. 228. Did Mr. Ramsey come there?

A. He has been there.

X Q. 229. Mr. Van Duyne?

A. He has been there.

X Q. 230. And other inspectors of the California Fruit Growers Exchange?

A. Yes, sir.

X Q. 231. How often has Mr. Ramsey been there?

A. Oh, he has no particular time. He might be there once a week and maybe not again for a month or two or three. I do not know. He just comes in and makes his round. I do not know how often.

X Q. 232. Has he been there frequently since 1916?

A. Oh, yes.

X Q. 233. And Van Duyne also frequently since 1916?

A. Yes, off and on, I do not remember the number of times or when, but I see him once in a while.

X Q. 234. And Mr. Ramsey was familiar with the way in which you were handling the fruit?

A. The way I was packing it and grading it.

X Q. 235. Did not Mr. Ramsey know of the operations that were going on in your packing house?

A. I think he did.

X Q. 236. Then he knew the borax, did he?

A. I never discussed it with him.

X Q. 237. But he was thoroughly familiar with your way of handling the fruit?

A. About the only thing I can really say was that he was familiar with the packing and the handling of the oranges. This field department sends a man out to each district to inspect all of our picking in the field. One of their duties is to check up all of our crews. All the California Fruit Growers Exchange packing houses have the same bunch [fol. 191] of inspectors for their picking and their packing and grading. His business or his man, would be to inspect the picking, the handling, the grading and the packing of the oranges; otherwise, he would not have to do with the plant at all.

X Q. 238. When did he first learn of your method of handling your fruit?

A. I beg your pardon.

X Q. 239. When did he first learn of your method of handling your fruit?

A. Just what do you refer to by method?

X Q. 240. Well, your way of handling it, the operations in your packing house?

A. I imagine shortly after he was employed.

XQ. 241. And when was that?

A. I really could not tell you.

XQ. 242. Was he in your house in 1916?

A. I do not recall.

XQ. 243. 1917?

A. I could not say.

XQ. 244. 1918?

A. I could not say.

XQ. 245. You do not know when he was there?

A. I do not remember the year. I do not even remember exactly that he worked for the Exchange, but he has been there off and on ever since.

XQ. 246. Mr. Morgan, you gave some testimony in this case, did you not, on November 19, 1926, at the office of the Rialto House Association in Rialto, California, before Miss Ruth Myers, as notary public, in and for the County of San Bernardino, in the presence of Mr. Graham, Mr. Townsend, Mr. Wadsworth and Mr. Steward?

A. I did.

XQ. 247. Do you recall that you were asked at that time whether both Mr. Ramsey and Mr. VanDuyne had inspected the oranges in your house frequently since 1916, and that you said, "Oh, yes"?

[fol. 192] A. I imagine I did.

XQ. 248. And then you were asked: "And they after talked with you frequently about the treatment of the oranges?" And you said: "Just what do you mean by treatment"? And Mr. Steward, who was cross-examining you, said: "Your method of packing the oranges here in your house?" And you said: "Mr. Ramsey I think is familiar with my way of handling the fruit, more so than Mr. VanDuyne, and I think Mr. Ramsey knows practically all of the operations of the packing house." Do you remember that; did you testify to that?

A. I think I did, yes.

XQ. 249. And do you remember that you were asked: "When did he first learn of that?" And you said "Well, he is supposed to know that, and instruct all of his understudies." And then the question was: "That was not my question. I asked you if you could state approximately when he first learned of your method?" And you replied:

"No, I could not tell you when he first learned it." And then the question was: "How long do you know that he has [fol. 193] known your methods?" And the answer was: "Oh, I should say, five, six or seven years, five or six years, something like that. I could not tell you exactly the numbers of years anyway." Did you give that testimony?

A. It is the same answer I just gave you a minute ago.

X Q. 250. Did you say a moment ago you never talked with him about borax?

A. I do not recall talking with him about borax. I might have, but I do not recall it.

X Q. 251. Do you know a Mr. James F. Bauchelle?

A. No, I do not say that I know him.

X Q. 252. Did you ever meet him?

A. I met a gentleman at one time, if you refer to that deposition there, I think that was his name; I am not sure. I think he called himself that. I do not know whether he spelled it that way or not. I believe he introduced himself as that, but I am not sure.

X Q. 253. Did Mr. Bauchelle call upon you at your packing house in April, 1926, and ask you whether or not the fruit being run through your house was being treated with borax?

A. I do not recall him asking me that question.

X Q. 254. Did you tell Mr. J. F. Bauchelle at that time that you were not using borax on the fruit passing through your house?

A. No, sir; all fruit going through my house goes through borax.

X Q. 255. So you deny you made that statement to him?

A. Absolutely.

X Q. 256. And do you not recall that on April 29, 1926, a man by the name of Bauchelle called upon you asking you particularly whether he could obtain from your packing house, fruit which had gone through your house and which had not been treated with borax?

[fol. 194] A. No. I do not remember just that occasion. Some man, as I told you in that deposition, called and told me he wanted to buy some fruit, and if I recollect he said he was connected with the Brogden Corporation or firm, he wanted to buy some fruit that had not been treated, or

something like that, I have forgotten the term he used, to try an experiment of some kind, and I would not say this was Bauchelle, but there was a man who did that. It may have been Bauchelle.

XQ. 257. Do you recall that when you gave the deposition I referred to a moment ago, you were asked those same questions which I have just now asked you, and you replied:

"It is possible some one may have asked me that."

A. It is possible he may have asked me that.

XQ. 258. And did you tell Mr. Bauchelle or such other person who asked you that on that day, that you were not using borax on the fruit?

A. I have never told any one I was not using borax, because I have always used borax.

XQ. 259. Did not Mr. Bauchelle at that time ask you to furnish him with oranges that had gone through your house and which had not received the borax treatment?

A. I do not know. It is possible he may have asked for them, but if he did, I told him they had gone through the borax tank.

XQ. 260. And did not you then and there tell him that you were not using borax on your oranges?

A. No, sir.

XQ. 261. And did you not at that time furnish Mr. Bauchelle with several hundred pounds of oranges which you said had not been treated with borax, and that you were not using borax in fact at that time in your house?

[fol. 195] A. No, sir.

XQ. 262. Did he purchase some more fruit from you at that time?

A. I do not know whether it was this man, but some man came in there and gave some sort of a name and purchased a lot of fruit of certain size, and came back in a week or two, or some days after that and asked me if he could purchase another lot, and I said, "Sure, purchase as long as your money holds out."

XQ. 263. And did you tell him after that second lot, that the fruit had been run through your house without any borax treatment?

A. No, sir.

X Q. 264. You have stated here this morning something about the amount of decay that you have experienced in your house at one time and another. Upon what do you base that statement as to the amount of decay?

A. The little notes that I have taken from records.

X Q. 265. From your records.

A. Yes, from the original account sales.

X Q. 266. From the original accounts?

A. Yes.

X Q. 267. And you did not bring in complete transcripts of these original accounts, and did not bring the original accounts here?

A. No.

X Q. 268. Do you recall when you were testifying as a witness for the defendant in this case in California, in this deposition that I have already referred to, you were asked upon what you based your testimony as to the amount of decay, and you said from your records and that you were asked to produce them. Do you remember that?

A. I do not know that I was asked to produce them. I remember some conversation, but I do not remember all that deposition.

[fol. 196] X Q. 269. May I show you that part of your deposition, and see if it refreshes your recollection (handing paper)?

A. I believe that was in there; yes, I think so.

X Q. 270. So that you were asked to produce them?

A. If it is in the deposition, I imagine I was.

X Q. 271. And did you produce them then?

A. I do not believe I was asked to produce them. I may have been asked to produce them. I do not think I did.

X Q. 272. You have just read, have you not, these questions:

"Q. Can you produce them?

"A. I think so.

"Q. Will you do so?"

Now, did you produce them in response to that request?

A. I do not remember what I answered in the deposition there.

X Q. 273. Your answer was it was a quite a job.

A. Evidently it was.

X Q. 274. Your answer was: "It is quite a job. It would take a day or two to do it, but we will do it if you want it." Did you do it?

A. I do not believe I was requested after making that reply, I do not just think I was. I believe I answered that I was willing to do it if he wanted us to take that much trouble, to go through our record back for years and years. I could do it. I told him. I do not think he insisted on it. I do not remember but I know I did say that.

X Q. 274a. Who is your secretary or bookkeeper, Mr. Johnson?

A. Mrs. Johnson.

[fol. 197] X Q. 275. Don't you remember that you and Mrs. Johnson stepped into the adjoining room saying that you would look at the records?

A. For what?

X Q. 276. For the amount of fruit that was shipped and the decay.

A. No, I do not believe I left the room.

X Q. 277. Did you produce the ledger?

A. I believe my secretary brought the ledger in.

X Q. 278. And have you got that ledger here?

A. No.

X Q. 279. Have you got any records relating in any way here to your use of borax?

A. Have I with me?

X Q. 280. Have you in California?

A. If you will make that specific so that I just get the drift.

X Q. 281. Have you any books of record of your association which show anything whatever with reference to borax?

A. Yes, we have some.

X Q. 282. What books?

A. I have to explain how we keep those records. Maybe I can get it to you clearer. I hope I can. Any purchase like borax or paste or any of those lesser articles come under the head of material and when those delivery slips come in the delivery boy as a rule takes them to the office to my bookkeeper. At the end of the month the firm from whom we are purchasing these supplies sends a monthly statement.

My bookkeeper verifies that to see that the man selling it has sent the correct statement and then enters that in her ledger as material. She does not specify whether it is borax or paste or what-not. It goes under the head of material. Does that answer your question?

X Q. 283. No. Is there anything in any of your books to show anything with reference to borax?

[fol. 198] A. We might have some sales slips there or some invoices.

X Q. 284. And that would be all?

A. Possibly we would have some receipted bill and that would be about all, I imagine.

X Q. 285. Have you brought any such things here with you?

A. No.

X Q. 286. When your deposition was taken in California you were examined, were you not, as to whether or not the account books that were shown to Mr. Steward and the other counsel there, contained anything with reference to borax and you examined the books and found they had nothing with reference to borax in them?

A. That particular book. He asked me if that book had anything about borax and I said, I think so, I am not sure, but I will look and see. I looked to see and I did not find anything that would bear on it.

X Q. 287. And then do you remember that you were asked: "Have you any record showing the use of borax?" You said: "Just what do you mean by the use of borax?" The questioner said: "I think my question is plain, Mr. Morgan. You have been testifying here about the use of borax, and I want to know whether you have any record as to the use of borax." Then you asked to have the question repeated and then you said:

"I don't understand the question. Just what do you mean by 'any record'?"

"Q. Have you any record showing the use of borax in your packing house in the manner in which you have testified?"

You said;

"I do not understand the question, what angle you are trying to get at, just what part of the question you want me to answer."

[fol. 199] "Q. Do you understand the testimony which you have given?

A. Yes.

"Q. You do?

A. Yes, thoroughly.

"Q. I am asking you to produce any record you can, showing the use of borax in your packing house. Can you produce such a record, or can you not?"

You answered: "I can." The question was:

"Q. Please do so."

And your answer was:

"A. Do you want a witness? That is a record."

And the question is:

"I asked you for a record."

Did you find any record?

A. I do not think there is any record in that book. It only referred to material.

X Q. 288. In any book?

A. No, I did not refer but only to that one book.

X Q. 289. Have you any records in any book with reference to borax?

A. Unless it comes under the head of material, I would not have.

X Q. 290. Have you found any record in any of your books with reference to borax?

A. I have not looked since that day.

X Q. 291. You know that November 19, 1926, you were examined at great length about what your records showed?

A. Yes.

X Q. 292. You remember that?

A. Yes.

X Q. 293. You remember that you could not find at that time any record in your books that showed anything about the use of borax; you recall that?

[fol. 200] A. I did not say I could not find. I did not find. I did not say I could not.

X Q. 294. Then in coming here to testify on this same subject matter again, did you look again to see if you could find any records?

A. No.

X Q. 295. Did not have any interest in the matter?

A. Yes, I had an interest in the matter.

X Q. 296. Who asked you to come here?

A. Mr. Warner, a member of the American Fruit Growers.

X Q. 297. Have you any interest in the American Fruit Growers?

A. None whatsoever, they are my keenest competitors.

X Q. 298. Then why did you come?

A. For the reason that I did not want anyone to tell me what I can or I cannot do or that I must pay a royalty for using something that I have been using previously. That is why I am here.

X Q. 299. Have you any bills or receipts showing the purchases of any borax at any time in the last ten years?

A. Oh, yes, there are some bills there.

X Q. 300. There are some bills there?

A. Yes.

X Q. 301. Have you got them here?

A. No, they are in California. If I had to bring those books it would take a trunk——

X Q. 302. I did not ask you about books, but bills and receipts.

A. No, I have not got them.

X Q. 303. You have not got any?

A. Not with me.

X Q. 304. Do you remember that when you were examined out there in California at this time that I speak of when you gave the deposition, that I spoke of, you were [fol. 201] asked for any bills or receipts showing the purchases of borax?

A. Yes, I believe I was.

X Q. 305. And you remember you went to look for some?

A. I believe I stepped into the next room to go through some old records in the storeroom to see if I could not find some old slips of records as to that.

X Q. 306. Did you find any?

A. Found two or three old delivery slips that mentioned borax.

X Q. 307. Where are those other slips now?

A. I do not know.

X Q. 308. You produced them at that time in the taking of the deposition, did you not?

A. I believe they took them away with them.

X Q. 309. Did not they take them away to have them photographed and give you back the originals?

A. I think they did send them back.

X Q. 310. So that you have the originals still?

A. I think they are around the office some place.

X Q. 311. In California?

A. Surely. I did not think they would be of any use if you had them photostated.

X Q. 312. You never looked for any more bills or receipts with reference to borax?

A. No.

X Q. 313. You have spoken this morning about buying borax in various places in small lots. How much did you pay for borax a pound?

A. Different prices; I think years ago we paid about $300 a ton.

X Q. 314. How many years ago?

A. About sixteen or seventeen.

X Q. 315. Did you ever buy a ton of borax sixteen or seventeen years ago?

A. No, we would get it on the ton rate, we would get it by the case.

[fol. 202] X Q. 316. Did you ever buy any borax sixteen or seventeen years ago?

A. I did not mean sixteen years ago, I mean the year of 1916 or 1917.

X Q. 317. You never bought a ton of borax in 1916 or 1917, did you?

A. No, I do not think we would use a ton in a year; we bought it by the case.

X Q. 318. A case?

A. I think it is a fifty-pound case or something of that kind.

X Q. 319. You bought it in boxes that size?

A. Yes.

X Q. 320. Up to what time did you do that?

A. I think 1922.

X Q. 321. Up to 1922?

A. I believe in 1922.

X Q. 322. Up to 1922?

A. Yes.

X Q. 323. What size boxes did you buy then up to that time?

A. Do you mean the particular box that contained the borax or the case?

X Q. 324. You are speaking of the case. What size is the case?

A. I think they were 100 pounds or something like that.

X Q. 325. One hundred pounds in a case?

A. I believe that was it, or fifty.

X Q. 326. And what did the case contain, separate boxes?

A. Yes, separate packages.

X Q. 327. Paper?

A. Cardboard.

X Q. 328. And how much borax was in each package?

A. I believe we used to buy it in five-pound packages and [fol. 203] then we had some in two pounds and maybe some in one, I am not just sure. I think there were—

X Q. 329. What is the shape of one of those packages?

A. Different shapes. I believe the larger package is, I don't know, ten or twelve inches long and six inches square, something like that. I believe they have three sizes or something like that.

X Q. 330. I think you just said in your testifying in California in the course of the deposition to which I have referred, you made a search and produced some bills or receipts showing borax?

A. I believe I did.

X Q. 331. Is it not true that the only ones that you could find that could date earlier than 1926, were these three which are photographic copies of the things you produced at that time?

A. These are the ones I did produce or the copies of them.

X Q. 332. You produced three other sheets, what are they?

A. Those are for purchases we made at different stores.

X Q. 333. It does not say what the material purchased was?

A. This would not say. This is a monthly statement.

X Q. 334. None of these last three show what the purchases were?

A. No, it just gives the amount.

X Q. 335. Of these first three sheets to which I have just referred the earliest one is dated January 5, 1925, and is for four borax pou. 1.20. What does "pou." mean?

A. I could not tell you.

X Q. 336. What does the 120 mean?

A. That is supposed to be the amount of money paid for that material.

[fol. 204] X Q. 337. What does the "four" mean?

A. I think that is boxes.

X Q. 338. Four boxes?

A. Or packages.

X Q. 339. At $1.20, is that it?

A. It says four.

X Q. 340. Four boxes pou.?

A. That is what it looks like.

X Q. 341. Is that four ounces or four pounds or four tons of borax?

A. I do not know just the amount it would be. I do not know what it would be.

X Q. 342. You cannot get four tons of borax for $1.20?

A. I never did.

X Q. 343. That is, you got $1.20 worth of borax at that time and borax was selling for what, about 30 cents a pound?

A. I really do not know.

X Q. 344. You so testified in your deposition?

A. The way we got this is, that when we ran out of the original supply we sent one of the boys up to the store and he got the few packages or pounds or whatever they need until our supply comes in. I don't know the sizes of those packages.

X Q. 345. Four borax pou. 1.20.

A. I know it says that.

X Q. 346. And does that mean four ounces or four pounds?

A. I do not know what it means.

X Q. 347. It would more likely be four pounds?

A. I do not know what it is, I cannot say.

X Q. 348. $1.20 worth of borax?

A. That is what it looks like.

Mr. Neave: I offer that in evidence.

(Received in evidence and marked "Plaintiff's Exhibit No. 76.").

[fol. 205] X Q. 349. That is the only bill or receipt that you found for the year 1925 that showed anything about borax?

A. That is the only sales slip that I found.

X Q. 350. What else did you find in relation to the borax for the year 1925?

A. I do not know but you asked me for a bill. That is simply a delivery slip.

X Q. 351. That is the only thing that you have found of any kind and under any name that refers to borax in 1925 in your association?

A. I do not know whether it is or not.

X Q. 352. Can you give me anything else?

A. They will be in the deposition that you took there. I cannot remember all that.

X Q. 353. If you have anything else in 1925, let me have it. Another of these things that you produce in California is a statement from the Blue Goose Pharmacy, dated March 1, 1926, is it not?

A. Correct.

X Q. 354. And it is a statement to the Rialto Heights Association?

A. Yes.

X Q. 355. That is yours?

A. Yes.

X Q. 356. What is the first item on it, adhesive?

A. That is adhesive tape. I made that purchase myself.

X Q. 357. And the next item?

A. That is a pair of scissors.

X Q. 358. And the next item?

A. Some more adhesive.

X Q. 359. And the next item?

A. Borax.

X Q. 360. And the next item?

A. Adhesive.

X Q. 361. And the next item?

[fol. 206] A. Sponges.

X Q. 362. How much borax?

A. One hundred pounds.

X Q. 363. What makes you think it is one hundred pounds?

A. I bought it myself.

X Q. 364. At nine cents a pound?

A. Nine cents a pound.

X Q. 365. Could you buy borax at nine cents a pound?

A. You could before, not now.

X Q. 366. Could you then buy borax at nine cents a pound?

A. I think you could.

X Q. 367. And that was for how many pounds?

A. One hundred pounds.

Mr. Neave: I offer that in evidence.

(Received in evidence and marked "Plaintiff's Exhibit No. 77.")

X Q. 368. Have you got any record of any kind, no matter whether you call it a sales book, statement or anything else for the year 1926, up to October of that year showing borax?

A. Do you mean with me?

X Q. 369. Yes, or record any place in the world?

A. No, unless it is in that deposition that will tell you what we found that day.

X Q. 370-1. The third of the slips that I referred to is Downing's grocery and meat market. That is dated October 30, 1926, is it not?

A. Correct.

X Q. 372. And it is a statement to the Rialto Heights Association?

A. Right.

X Q. 373. What is the first item on there?

A. Case of washing powder.

[fol. 207] X Q. 374. And what is the amount?

A. $6.72.

X Q. 375. The next item?

A. Six borax, I think it says pounds, I believe that is pounds.

X Q. 376. Six pounds of borax?

A. It looks like it, $1.68.

X Q. 377. Nine cents a pound, is it?

A. I would not say nine cents a pound. That might not be pounds.

X Q. 378. Did you make the purchase yourself?

A. No. That is only a delivery slip and I am not sure whether it is pounds or what it is.

Mr. Neave: I offer it in evidence.

(Received in evidence and marked "Plaintiff's Exhibit No. 78.")

By Mr. Neave:

X Q. 379. There are three other slips that you produced in California in the deposition which I have referred to a moment ago and they are statements from Needham Brothers?

A. Yes.

X Q. 380. Dealers in staples and fancy groceries?

A. Yes.

X Q. 381. And the first of these is dated January 17, 1920, and the next February 9, 1920, and the next April 1, 1920; is that right?

A. Yes.

X Q. 382. And each of them is "To bill rendered" and the amount in the first is $32.35 and the second $5.45 and the third $5.45; is that right?

A. That is right.

X Q. 383. The seenod and third, that is, the February and April statements are for the same amount and are for the same thing, because the April statement said it is for January account rendered?

[fol. 208] A. That is account rendered.

X Q. 384. That is, bill rendered on February 9th for $5.45?

A. Yes.

X Q. 385. And in April 1st they rendered you an account for $5.45?

A. Yes.

X Q. 386. Did not the April statement and the February statement refer to the January account?

A. I could not say.

X Q. 387. And there is nothing on those three that indicates anything about what the purchases were for?

A. Nothing on there.

Mr. Neave: I offer those in evidence.

(Received in evidence and marked "Plaintiff's Exhibit No. 79.")

By Mr. Neave:

X Q. 388. What is this that I show you?

A. That is an order from the Fruit Growers Supply Company, sending us, you might call a notice that we are charged with one ton of borax.

X Q. 389. What is the date of that?

A. November 3, 1926.

X Q. 390. That is, you had bought from them a ton of borax in November, 1926?

A. No.

X Q. 391. What does it mean?

A. We did not buy from them, we bought from the Pacific Coast Borax Company and they in turn billed that through the Fruit Growers Supply Company, who are the purchasing agents for all of the members of the California Fruit Growers Exchange.

X Q. 392. And that is shown in November, 1926, you had then bought a ton of borax?

A. Yes, that is what this slip refers to.

Mr. Neave: I offer that in evidence.

[fol. 209] (Received in evidence and marked "Plaintiff's Exhibit No. 80.")

X Q. 393. Now, have you any book, records, vouchers, receipts, bills—anything other than the four exhibits we have just been looking at that show in any way or refer in any way to borax?

A. We might have.

X Q. 393a. You might have?

A. Possibly, yes.

X Q. 394. Have you found any?

A. I have not looked.

X Q. 395. You remember, don't you, a protracted cross-examination out there in San Francisco in the deposition, to bring out these things there?

A. What is that?

X Q. 396. You remember a protracted cross-examination, don't you, out in San Francisco, bringing out these records?

A. A very lengthy one at Rialto, a very lengthy one.

X Q. 397. As I understand it, you say that in 1916 and in subsequent years, you were purchasing borax that was contained in packages contained in a case; is that it?

A. Yes, that came in cases to the grocery store and he delivered them to our packing house.

X Q. 398. And the packages were inside the cases?

A. Surely.

X Q. 399. And how many pounds were there in each package?

A. They were different sizes. If I remember it correctly part of them were 5-pound packages; some of them were 2-pound, and he may have delivered some in pound packages. I do not just remember. I know he made us a lower rate than the other stores provided we would purchase all we used from him, I just do not remember the price.

[fol. 210] X Q. 400. Now, this last exhibit that we put in here indicates that in November, 1926, you purchased a ton of borax?

A. It does.

X Q. 401. Have you purchased a ton since then?

A. No.

X Q. 402. Have you purchased any more since that time?

A. No.

X Q. 403. What was your purchase of borax immediately preceding November 1, 1926?

A. Just what do you mean?

X Q. 404. When did you purchase borax next preceding November 1, 1926?

A. I just could not tell you.

X Q. 405. This soaking tank and washer were elevated about nine feet off the floors were they not?

A. Something like that. I do not just remember it exactly, so that they could walk or truck under it with a seven-foot truck.

X Q. 406. Were the washer brushes open to view, could you see them if you got up that high?

A. You could see in either end and we had a door on top that you could raise back and look at them. We used that for cleaning each night.

X Q. 407. You have a brother living in California, Mr. Morgan?

A. I have.

X Q. 408. What are his initials?

A. I have two brothers.

X Q. 409. Have you one who is a member of the Borax Committee of the California Fruit Growers Exchange?

A. I do not know whether he is on the Borax Committee or not. He is a member of the California Fruit Growers Exchange.

X Q. 410. Give me the name of both of your brothers.

[fol. 211] A. The one you refer to, I think, is M. Morgan.

X Q. 411. Is he on that Borax Committee?

A. I am not sure.

X Q. 412. Was he familiar with your work from 1916 on, as regards the use of borax?

A. I do not know whether he was or not.

X Q. 413. Did you have an overflow pipe in your soaking tank?

The Court: I did not get that.

X Q. 414. I beg your pardon, sir. Did you have an overflow pipe in your soaking tank?

A. Yes.

X Q. 415. How high was the top of that from the bottom of the tank?

A. I do not remember, an inch or something like that; I really do not know the exact height.

X Q. 416. Only above the bottom of the tank?

A. The bottom of the tank—it extended up perhaps an inch or two from the top of the tank.

X Q. 417. So that the water could never get any higher that that, it would overflow if it got that high?

A. When the water got up about level with the top of the tank, if the overflow increased, the man cleaning it up would neglect to shut it off, or something like that.

X Q. 418. You said that you figured on a carload of oranges a day, is that right?

A. About a little more or a little less.

X Q. 419. A carload, and were you figuring that at 400 boxes?

A. No, I was figuring that 462.

X Q. 420. 462 boxes a day?

A. Yes, sir.

X Q. 421. And how long is a day?

A. Eight hours.

X Q. 422. What is the lunch hour, how long?

A. One hour.

[fol. 212] X Q. 423. Twelve and one, or one and two?

A. Twelve to one; eight to twelve; and one to five.

X Q. 424. In 1916, 1917, 1918, 1919, along there, were you using borax all the time, did all your oranges go through the borax treatment?

A. In what years?

X Q. 425. The early years, 1917, 1918, 1919?

A. Surely.

X Q. 426. That is all of the oranges that have gone through your packing house from 1916 to date, have gone through this borax treatment that you have spoken of?

A. Absolutely every orange.

X Q. 427. This drip pipe that is over the brushes you spoke of a little while ago, is there a valve on that, that you can open more or less to let more or less water in?

A. Oh, yes, I might——

The Court: Have you something to add?

The Witness: Yes, I might explain why that valve is there, so that you will get an idea. Every night when they finish, the man who cleans out this tank turns on the water and goes in there with a broom and scrubs all the inside around this frame over the brushes and through the tanks so as to keep it thoroughly clean, that is what the valve is for.

X Q. 428. Now, you have given me the number of cars that you shipped in each of the seasons beginning in 1921 to 1922, up to date. Did you figure those cars on 400 boxes to a car or 462?

A. 400. Those are off my annual records.

X Q. 429. You consider those at 400?

A. All our annual statements are made up on 400 boxes to the car. I took those off my records.

[fol. 213] X Q. 430. This total number of boxes, 507,000 odd would be boxes of 400 to a car, would it not?

A. 400 to a car for 10 years, 1916 to 1926 inclusive; it is the total number of boxes.

X Q. 431. So I divide that by 400 to get the number of cars?

A. It all depends on what kind of car you want. If you want the car according to the annual report of the California Fruit Growers Exchange, you would say 400. If you want the actual number of boxes contained in the car of shipment; that is 462.

X Q. 432. But if I want to figure it in the same way that you figure it on your shipments for the individual years, 1921 on, I divide by 400?

A. Surely.

Mr. Neave: That is all, Mr. Morgan.

Re-direct examination:

The heat of the water in the tank is from 85 to 100 in the winter time, about 85.

R.D Q. 434. I call your attention to this photostat sales slip from Downey's Meat Market, January 5, 1925, and call your attenton to the word that Mr. Neave has spelled "Pou." Do you think it probably is "Pow"—an abbreviation for "powder"?

A. I could not tell; it could just as well be "Pou" or "Pon." If that meant four 5-pound borax powder boxes at $1.20, that would be six cents a pound.

I think borax did sell in 1925 as low as 6 cents a pound in carload lots. I think it sold for 5½. I believe there was some quotation about 5½. I believe if you took a carload lot or was in a position to take a carload and divide it with a lot of growers, but a ton lasted us a lot of time, and we were not able to take advantage of that all the time. It has only been the last year or so that we could do that.

[fol. 214] We did not make a practice of keeping the sales slips from purchases we made around town. We do not keep any sales slips as part of our permanent record. The only way we have a sales slip is when a delivery boy would bring into the packing house something that the foreman or manager ordered, but as a rule he takes them to the office and the bookkeeper at the end of the month, when the firm rendered a statement, he will take it up and throw it away, simply into whatever category it would be long, if it was a

material item, she would make it a material item and then throw away the slips.

I did not search any for the word "borax" in the books before the deposition in California and have not searched any since, and perhaps searched a minute and a half or two minutes during the deposition. All the search that I made was on the day of the depositions for perhaps a minute and a half. That is my personal search. A search made by any member of my staff was not permitted by Mr. Steward, the attorney, and since that date I have made no search at all. I made no search before giving that deposition.

In the examination of our books that I made personally, I observed that materials of all kinds other than what we purchased through the purchasing department of the Exchange were entered as material. This examination of our books in which I noted the entries as material was made only on the day of the deposition, the day it was taken. In our office we have very few sales slips or old bills of that sort. Those bills that I did produce, the one of January 17, 1920, and the others—the statement rendered (Plaintiff's Exhibit No. 79)—were found in the little storeroom off from the main office.

[fol. 215] I only went through one little box of stuff that was there, just searched hurriedly through it, and that was all I could sort out. I did not see any others in that box. There may have been some. I do not think there was, though. This is all I found for the dates prior to 1923 on that day.

I was asked some questions about a man calling on our packing house asking for oranges which had no borax treatment. I recall giving that testimony. I do not remember just when that was. Some time during the past season. I could not tell you the month even. It may have been on April 21, 1926, as stated by Mr. Neave in his question. I do not remember the date. It might have been. It might not have been. I do not even remember the month. There are so many people coming and going I do not keep those things in mind.

So far as I know that is correct.

When my deposition was taken I had some borax on hand. That was part of this ton that is billed here on November 3, 1926. I showed that borax to the representa-

tives of the plaintiff. I allowed them to examine the plant fully and measure the tank and otherwise. We walked all over the plant, from the basement up to the top of the plant, part of them did. I was in the basement and counted the sacks myself for the borax.

Recross-examination:

About my finding those statements that have been put in evidence, my deposition in California was being taken in a room adjoining the one in which I had our books and papers.

I might make that plain to you, sir, so that you get that. On the south is my own private office; directly off that is the general office; then north of that opening from that room is the vault, and opening another door is the storeroom there.

[fol. 216] My testimony was being taken in one room and I went across into the little storeroom and brought back a package of those sales slips, and all kinds of old slips and sorted through them. There were a great many of them. Then I brought back into the room where the examination was being held, just a few slips out of the package I had in my hand, yes, the ones that he asked for.

The package contained a large number of odds and ends, the books and magazines, just out of an old box, as evidently that stuff had been shoved into there.

I examined our ledger during this day on which my examination was taken for probably a minute and a half. I believe that was the only book that I examined.

Mr. Morton: If your Honor please, to keep the continuity of the testimony, there was a deposition taken of one employee of Mr. Morgan who is not here, and if it meets with your idea, we will read the deposition if you wish, or state its substance.

(The deposition of George Wood is thereupon read and received in evidence.)

Albert H. Morgan

Albert H. Morgan, recalled as a witness on behalf of the defendant, testified as follows:

Direct examination:

At the time my deposition was taken, I did not know that Mr. Wood's deposition had previously been taken.

I believe Mr. Graham came down and introduced himself, or an attorney for the company came down and introduced [fol. 217] himself with Mr. Warner, I believe, and wanted to know if I had used borax and I said, "Sure," and I said, "Do you want to see how?", and he said, "I will tell you what we are here for, would you be willing to tell us how long you had been using borax and how much?" and I said, "Sure I will tell you." He said, "We will bring some gentlemen out in a day or two and see you." Then they called me on the 'phone and asked me if I would be in the office on a certain day and they said, "We will be out to see you." That is the only notice I had of the taking of my deposition.

I was not asked to make any search for our records at any time prior to the time the deposition was taken, never until they were taken in the office. I did not know that Mr. Wood had been interviewed at the time I gave my deposition. I did not know until after it was finished, Mr. Warner said, "Well, we just got through the other day by taking the deposition of one of your foremen," and I said, "Which one?" And he said, "George Wood." And that is the first knowledge I ever had of it.

Cross-examination:

Mr. Warner asked me to come here today or come East for this trial. He asked me to come, I think it was three days before I started or something like that. I believe he called me up on the 'phone on a Saturday or on a Friday and on a Sunday he drove from Los Angeles sixty miles away to my home, talked with me, and asked me if I would come.

I think that was the first intimation that I had that the American Fruit Growers wanted me to come here to testify. His telephone message was not some four or five or six days before I started East. It seems to me that it was on a Saturday before I left on a Tuesday. He talked with me on the Sunday before the Tuesday I left.

[fol. 218] Redirect examination:

My brother, the one that Mr. Neave referred to as being on the committee, lives about sixty miles from my place, at Pasadena. My place is sixty miles east of Los Angeles, and he lives adjoining Los Angeles, sixty miles west of me.

Frank C. Bishop

Frank C. Bishop, of Huntington Park, Los Angeles County, California, called as a witness on behalf of the defendant, testified as follows:

Direct examination:

I was formerly a resident of San Francisco. My father's name was Simeon Bishop. My father is dead now. I am forty-four years old. I resided around 1900 in San Francisco. I know that my father took out a patent on the matter of preserving foods.

(Witness is shown a copy of the patent issued in the name of Simeon Bishop and is asked to state whether he can identify it.)

Yes, I have seen that patent and I have read it. This is a copy of my father's patent which I had in mind. I am familiar with the process described in that patent. I know to what extent that process was practiced by my father. I can state that we used that process for, to my best knowledge, about two years, principally eggs, although we did process some fruit.

As near as I can remember it was from 1902 to 1904, or it may have gone into 1905, but I think those two years about cover it. My father practiced the process not as an individual but it was a business. The company was formed and I suppose you would call it as a business.

[fol. 219] The name of the company was to my best memory the Antiseptic Fruit & Egg Preserving Company.

(Witness's attention is called to a certified copy of articles of incorporation of the Antiseptic Fruit & Egg Pre-

serving Company and is asked to state whether or not he can recognize that. His attention is particularly called to the paragraph at the bottom which contains the names of the incorporators and he is asked to state if he knows any of the parties whose names are there.)

I know—the only one outside of my own family is a Herbert that I remember. I do not remember Macy. The Bishops there are all members of my immediate family. Harris Bishop was my brother. He is dead. F. W. Bishop is a brother living in Los Angeles. S. Bishop was my father.

I cannot state definitely whether the second paragraph of the articles of incorporation states the purpose for which the company was formed, because I never saw this article before. I was just there to help treat the articles that were treated with the process and that is all that I did.

I was around eighteen at that time, between eighteen and nineteen, I believe; when we started I was around eighteen. I was not going to school at that time.

I will describe as near as I can recall what I did myself in carrying out this process. In the treatment of the eggs, we first put the eggs in the solution of boracic acid and after that we dipped them in a warm solution of gelatine and removed them and let them dry and then put them back in the cases. In the treatment of fruit we dipped them in the solution and then removed them and they became dry and we dipped them with the solution of gelatine and sometimes we wrapped the fruits with paper afterwards. This was uncooked fruit.

[fol. 220] I can recall two fruits, the orange and pears, that I remember definitely, and there may have been others. Our business was not large and the egg part of it was the largest part of the business. However, I distinctly remember treating some fruit, but it was not a large amount.

The eggs were shipped to sea, most of them on sailing ships, I believe practically all of them, although some hotels may have taken some of the eggs and the fruit I cannot definitely state what became of that. I feel sure that the process was effective in preserving the eggs.

When we first started in, of course, people were skeptical and we treated a few cases of eggs and shipped them at sea

for a round trip to China and back and when they came back they were in perfect condition. I remember that as one incident in regard to the eggs. I did not have any other employment at the time, I was helping in the practice of this process.

When I just graduated from the high school in San Francisco, just previous to that, I graduated at seventeen and I had not any steady position until I helped my father, until along toward when I was about eighteen or nineteen.

I helped him for about two years, I think it was, from 1902 to 1904 of my best recollection. Then I went into business for myself. I went into the cigar business on Market Street in San Francisco.

I cannot definitely state whether or not the business of this company was kept up, although my father was not in San Francisco, I know during 1906 he was in a town named Ukiah in California. The reason I remember this is because when we had the fire he could not get back to San Francisco through the fire lines. I do not believe the business was kept up after the fire, but I do not remember. [fol. 221] I cannot say definitely how much fruit at a time was processed in this manner, but it was not large. We treated that fruit out in a residential part of the town and I believe it was next door to where we lived, in a room, and I think that it would not have been more than probably one or two or three boxes treated at a time. At different periods we treated the fruit, but not every day.

It is rather hard for me to remember how much fruit was treated during the two-year period. It has been so many years ago, but I suppose probably once a week we treated fruit, possibly not that often. That fruit was sometimes oranges and sometimes pears, and possibly other fruits. At that time those were the only two definite remembrances that I have.

The company had another place of business besides the room which I have just described. We treated the eggs on Davis Street in San Francisco and that is what was known as a loft over some other stores and that was a larger place.

All the fruit was treated in this room I first mentioned. We did not treat any eggs there. The eggs we treated on Davis Street. The room where the fruit was treated was in a building that was rented, I believe. The only other

business carried on there besides this food-treating business was on the ground floor, a butter and egg establishment, I believe. That is where my father bought his eggs from a firm known as McArthur and Company, as I remember it, that is the only one that I distinctly remember.

There was no other business carried on in this room. We were there alone in that room.

(A copy of the articles of incorporation of the Antiseptic Fruit & Egg Packing Company is offered and received in evidence and marked "Defendant's Exhibit No. 6.")

[fol. 222] (Witness is shown an orange and is asked to state to what extent that orange resembles in appearance the oranges that he testified to having treated.)

When we treated them they seemed to have a heavier coating of gelatine. We were not successful in getting a very thin coating on. We generally had to dip them twice and it made quite a heavy coating. They did not really look as nice as that, however. You can see that that is gelatine. This orange looks about the same except for the heavier coating.

Mr. Morton: I do not know whether we can offer a perishable article in evidence but we will let it stay here for the balance of the trial.

My father prepared the solution and the gelatine in which we dipped the fruit. My father was a practicing physician. I have seen him prepare these solutions, although I never paid particular attention to the details. I have been in the same room with him when he had prepared it.

I did the dipping. As near as I can recollect we had a sort of wire container that we put a certain number of articles in, eggs or fruit, and submerged into the boracic acid solution first and then we would take that out and put it on a—the eggs we would put on the table and after that we dipped them in the gelatine solution and then we had sort of little racks for them, as I remember, something like a lath that they would fit in so that they would not roll off and the fruit we did the same.

We let the fruit dry and then dipped it into the gelatine and set the fruit up again to dry. I was asked by both

sides several times to come East and testify in this case. I am here for the Brogden people, I believe, that is the way it is pronounced. It was Thursday that I reached New York, Thursday morning. I stayed in New York until I came down here today.

[fol. 223] Cross-examination:

An orange was shown me a moment ago. I did not have anything to do with the preparation of that orange. In 1902 and 1904, in that period that I have been testifying about, I did not know anything about blue mold. My father did not discuss blue mold with me.

This place on Davis Street we processed the eggs only. To my best recollection the eggs that we treated there were shipped to sea on sailing vessels and I believe there was a firm of ship chandlers in San Francisco that attended to that work for my father. We sold the treated eggs and got money for them.

In treating those eggs the eggs were dipped into a boracic acid solution. We did not use borax. The strength of the boracic acid solution was that stated in my father's patent.

I took the eggs out of the boracic acid solution, but I would not say we immediately dipped them into the gelatine solution. Sometimes we would lay them aside until we washed a few of them and then we would wait for them to become dry and then dip it into the gelatine.

This gelatine solution was very thick, it had to be quite warm so that you could dip the fruit successfully. I would not say it would be hot, but it was quite warm. I imagine that was somewhere around 90 when we were dipping it. I would not state definitely what it was. The gelatine was dissolved in water to make this solution.

My father prepared the solution and all the solutions and all I did was the manual labor. The eggs were put in a sort of wire tray or wire container so that we could dip a few at a time, just to sort of hasten the work.

[fol. 224] When the gelatine solution was hot it was a little thinner than thick molasses, however, when it became a little cold it became sticky but it was still soft. We would dip it even when it was not up to its highest heat. After we had taken these eggs out of the gelatine solution we put them on a rack to stand and dry.

As I remember it took anywhere from six to seven or eight hours for the gelatine coating to set.

Sometimes we would dip again, i. e., the same eggs would be dipped twice.

Sometimes we would remove the egg from the place that we had it and some of the gelatin would come off and stick to the wood or whatever we had it laying on and we would dip it again just the portion that the gelatin had been taken off of. In some places the coating was quite thick, and in some places it was thin. Our method was rather crude and we did not get a very smooth job. You could see where the gelatin had run and sometimes caused quite a thick spot.

By quite thick, I mean probably as much as a quarter of an inch right on the bottom where it was laying. Then it would get thinner at the top where it ran down.

We had a good deal of trouble with the drying of the gelatin. We built several different forms of racks, but I remember that we did have trouble in trying to get the gelatin on so that it would look nice and be a smooth job because the way we did it at first, and really all through the process, it was not nice and was rather lumpy looking.

What we tried to do was to get eggs hermetically sealed. We considered that important. We continued this work on the eggs to the best of my knowledge for two years.

As I remember the cold storage entered into the business about that time and that was one of the discouraging fea- [fol. 225] tures of our business that discouraged my father.

I suppose we could have sold some. However, so many steamers superseded the sailing vessels those days and they nearly all carried their cold storage facilities themselves and they shipped right in their own ice boxes, and then again they were so much faster than the sailing vessels, that they did not need so much protection. And so, as I remember, we stopped the business of eggs.

I cannot definitely state what the boracic acid did in the way we used it on those eggs. However, it was a cleansing agent as far as I know, and I do not know how that would preserve an egg. We used some boracic acid in the gelatin too. They put a little boracic acid in, I remember him talking about putting boracic acid in the water that he melted the gelatin in so as to preserve the gelatin, to prevent it from deteriorating.

It was during this same time and before we gave up the coating of eggs that we were doing something with fruit near our residence. After we stopped the egg proposition we stopped the fruit proposition also.

I cannot definitely state if we ever tried treating grapes. I do not remember about grapes myself. We treated oranges there. We sometimes dipped those twice, as we did the eggs. The treatment was just the same as the egg treatment.

I do not know what became of any of the fruit that was treated up there next to our residence. I do not know of my father ever having treated some of that fruit and kept it so as to see what the result of the treatment was. Well, I can not state what became of that fruit, but I remember treating it.

That work with the fruit was something that this company that we had formed was carrying on. That was the same business with the company all the way through. [fol. 226] However, the biggest part was the eggs and we had them in a bigger place; that was all, I guess; that was the idea.

I do not know anything about the effects of this treatment on fruit. I never made any observations, i. e., I could not definitely state how long it kept them. The gelatin solution was prepared as stated in my father's patent to the best of my knowledge. In this fruit that we treated up near our residence, we did select our fruit that we were going to treat, i. e., we would pick out and discard any blemished fruit that came along. We tried to pick the best fruit. We had all the eggs candled also to get the best eggs that we could.

The eggs stay in the boracic acid solution a very short period. We just dipped them in and took them out. The same thing applies to the fruit.

ALFRED R. SANDLIN

ALFRED R. SANDLIN, of Leesburg, Florida, called as a witness on behalf of the defendant, testified as follows:

Direct examination:

(A copy of the Bishop Patent No. 683,899 is offered and received in evidence and marked "Defendant's Exhibit No. 7.")

My initials are A. R. I am a citrus fruit grower and a realtor. I have been engaging in the packing of citrus fruit.

My first connection with the citrus packing industry was with A. G. Nye of Orlando, Florida. I was with Mr. Nye for one or two seasons. I had charge of the office work and incidentally did some road work, buying fruit, and seeing it shipped into the packing house. Mr. Nye oper- [fol. 227] ated a citrus packing house in Orlando. When I left Mr. Nye I went to Drennen & Co., Maitland, Florida. I was secretary and treasurer to that company and I had charge of the entire work, office and outdoors, with a house foreman under me.

They operated a citrus fruit packing house. They operated just one house. I was with them for one year.

Then I went to Ocala, Florida, where I became sub-exchange manager for the Florida Citrus Exchange, known as the County Exchange. It was a part of the subsidiary company of the Florida Citrus Exchange.

That sub-exchange included in it a number of packing houses. The sub-exchange was situated or made up of different associations and the associations had their own packing houses, and in some instances where there was not an association, they were called special shipper and operated their own packing houses, which were affiliated with the sub-exchange the same as an association.

The office was a clearing house from the Florida Citrus Exchange to this Association, and I was a special shipper, and looked after in general the welfare of the association and the members of the association.

I knew of Mr. F. S. Pond in Florida. Mr. Pond is dead now. When I knew Mr. Pond he was manager of a citrus packing house at Eustis. That house was not in my district. That was in Highland sub-exchange. It was a Florida Exchange house.

When I knew Mr. Pond there, it was in about 1913 or 1914, I think, when I became acquainted with him. Later

on I knew him up to the time of his death, but he did not stay there all of that length of time.

I do not recall all of the brands under which Mr. Pond marketed the fruit from the Eustis house, but his leading [fol. 228] brand or the brand for his best grade of fruit was the Pond Lily.

I recall the season along about that time when the decay was exceptionally bad. We frequently run into those decay periods. It depends on the warm weather and foggy mornings, while the fruit is damp, and during that time we did run into a bad decay period. That is in 1913 or 1914 at the time I have reference to.

The Florida Exchange at that time got decay reports like they do now. We all got them, not only the Florida Citrus Exchange, but all shippers. These reports we got, showed the percentage of decay in the other houses as well as the ones we were affiliated with. They were the market reports, the special auction reports.

The fruit was carrying from the Eustis house fairly good, better than an average house of the state and less decay, consequently he was getting probably a better market price for it, selling better. The source of my information as to that fact is the market reports.

I remember having conversations with Mr. Pond on the subject of his decay. I met Mr. Pond and we were discussing the fruit situation

Mr. Pond and I were discussing this decay period, and I asked Mr. Pond why it was that his fruit was going through with less decay than the average fruit of any other packing house practically, and also about his prices, and his answer as I remember it was: "That is very simple." And I said, "What is the secret of it?" He said, "I put some borax in my water to wash the fruit with." And I do not know whether he expressed whether it was useful—however, that has not anything to do with this. Well, that was the gist of the thing. I was just telling the Court that we had discussed different things because vitriol or bluestone had [fol. 229] also been tried out by a few and not all had washers, or all packing houses I would say at that time had what they call soaking tanks, and naturally they were all interested in keeping down decay and getting it packed and graded as best as possible, so as to get as much out

of our products as we could, and that was our object in going into these things.

At that time, as I remember, I asked Mr. Pond as to how much borax he used in his water or how he applied it, but I do not recall his answers to those questions.

I had been in the Eustis house. As I remember, they had pretty near all kinds of machinery at that time, different sizes and the washer, I can not recall the name of it, but it was a disc washer and run, I would say, the size of a large-sized plate round, and with a brush nailed to a board on each side to keep fruit at the top of that disc, travelling on the top of that disc, and he had a soaking tank, a place in which to dump the fruit and pass it up on a roller conveyor on to these brushes, as I recall it.

These discs had bristles on them. I say a bristle now, I do not know whether you would literally call it a bristle or whether it would be a fibre brush, but the same idea as a bristle brusher, of course. It was a revolving disc with the brushes sticking upright and the fruit dumped on that. I did communicate what Mr. Pond told me to others about using the borax. I suggested it to the packing houses that I supposed handled the product from the sub-exchange manager, and I recall particularly suggesting this borax treatment to Mr. Dupree of Citra of Florida of the Citra Fruit Company.

That was what we termed one of our shippers to the sub-exchange at that time, a special shipper, one who packed [fol. 230] his own fruit. He shipped through the sub-exchange of which I was manager.

I do not know how long Mr. Pond stayed at Eustis as manager, because I do not know when Pond came from California to Florida. As I understand the Florida Citrus Exchange secured the services of Mr. Pond and brought him from California, and I do not know whether he was in charge of the packing house or whether he was a field man before taking charge of a packing house. I do know later on, after I became acquainetd with him, that he was what we call an inspector, a State inspector that travels over the entire State to different packing houses to see that the grade and packing and machinery and everything was going along in a satisfactory or a reasonably satisfactory way as it could be under the circumstances.

I have not at any time since this conversation with Mr. Pond managed a packing house myself. I have never actually had the personal management of a packing house. I say that in this way—I had the management of a packing house under my care, but there I had a house foreman or superintendent, therefore I did not bother myself about the details of the actual packing of the fruit.

I cannot recall to specify the names of anyone else to whom I told about Mr. Pond's use for borax, but I have every reason to believe that I suggested it to all my shippers at that time. The particular instance of Mr. Dupree was that when I went into his house I found a solution in his soaking tank and in discussing it to find out what he was using brought the thing up, you see. At that time he was using caustic soda in his water and I asked him if he had any borax or had used borax, as I recall.

Q. 47. Did you ever use borax yourself?

A. Not with Drenman.

[fol. 231] I have never used borax in the packing house. Of course, I did not have any charge of packing houses and I did not see it used, actually seeing it put into the water.

Cross-examination:

I do not know, sir, where it was that I had this conversation with Mr. Pond, but the probabilities are it was in Orlando. Mr. Pond as well as myself were travelling around some and maybe I met him in Tampa, but I do not remember where the meeting was. We were both out on the road and where I ran into him I do not know.

I think it was in 1913 or 1914, I would not be positive of those dates. It was during one of those shipping seasons, 1913-14 or 1914-15. That was twelve or thirteen years ago if those dates are correct.

Of coure I do not remember accurately what it was he said at that time. I do not think I have made a positive statement to that effect. The reason it made an impression on my mind is because I think usually when you are—if I may state it in my own way—usually when you are interested in a product and you are trying to better your condition you remember something of that nature. The same as I do now, not germaine to this question here in the

court, but I would like to state this much in answer to the question. We spray our fruit now and at that time.

And while my brother who is in charge of the actual work on our holdings in Florida today, he has told me of these different mixtures and the different chemicals and sprays and we are experimenting practically all the time with it and he has told me from time to time of using a certain amount of kerosene in the chemicals that we are buying from the different spray people. He has told me as to how [fol. 232] much he has used in the tank, a tank holding 200 gallons, but I cannot tell you how much he said he put in at this time but I do know that he has put in enough to defoliate some of the trees, and he has gotten it down to a place now where he thinks we are getting good results from it.

I do not remember what Mr. Pond told me about the amount of borax to use. At the same time we discussed vitriol or bluestone. I do not know that he discussed washing powders, but some of the packing houses, they had very dirty fruit, very frequently they would put in Gold Dust or some other washing powders. I do not recall whether he mentioned anything else.

That was F. S. Pond, as I recall the initials, I think that is it.

(The witness is shown a copy of the Florida Grower of May 23, 1924, which is Plaintiff's Exhibit 28. On page 10 there is a picture of somebody.)

I recognize that as Mr. Pond. I did not go through his house at the time of this conversation. I was not in Eustis I am quite sure at the time of this discussion.

I cannot recall that I read this article by Mr. Pond which appeared in the Florida Grower in May, 1914, but I have been a regular subscriber to that paper up until perhaps a year or two ago.

I do not recall if I was a subscriber at that time. Perhaps I was but just when I started I do not know. Around the packing houses practically everybody got that magazine also. I may have read it but I cannot say that I have.

I do not know that I discussed with Mr. Pond, at the time that I speak of, the question of the white fly and the injury done by the white fly. It was decay that we were discussing at that time.

[fol. 233] I can mention a specific plant that I knew of in 1914 that did not have a soaking tank in front of the brushes. At Mr. Ney's house in Orlando, Florida, there was no soaking tank. He had the Nye washer, his own patent. He had three sets of brushes on it, two stationary and one rotary set on jigs. One belt that went on cog-wheels. I call it a rotary but I do not know if that is the proper way to describe it, but it was probably set at a 45 angle degree and the the fruit travelled upward to a dripping rack and this one set of brushes that was running on the wheel would carry the fruit up and that would come up and go through a small box in which there was water, and that water was practically running all the time. These stationary brushes, there would be enough water coming off from the one running to keep the other brush wet, and in that way it scrubbed the fruit. The fruit ran out to the brush from what we call the dumping rack.

The water was supplied to that washer through a spigot hanging over a small box. That spigot was open practically all the time. The intention was to keep that water running all the time and an overflow pipe to take it out if it went too fast. You would have to cut it off and the brushes would take out a certain amount of it.

I do not recall any particular packing house in Florida in 1914, that did not use the soaking tank except those using the Nye washers.

In 1914, after my talk with Pond, there were a number of packing houses under my direction. I do not know if you would call it under my direction or not. I only acted in an advisory capacity. Each association had their own managers, and he was accountable to the board of directors, the same as I was accountable to my board of directors. Each association had a director in the sub-exchange and [fol. 234] each association had their board of directors and handled their own individual affairs.

I did not see to it that any of these houses used Borax because I could not have forced it if I wanted to. The only thing I could do would be to suggest to them and give them the reasons for any changes in the use of anything. They were about fifty-five miles from Mr. Pond's house. I have been through Pond's house. I did not see him using borax.

I cannot tell you the name of the washer used in Pond's house. I can describe it to you, but the name of it I do not know. I tried to describe it a minute ago. Mr. Pond was not using the Nye washer. As I recall it, he had a soaking tank. The brushes that Pond was using were arranged in that washer in the following manner:

This brush was something of the size of an extra large plate, running upright, rotary, and the fruit was kept on that, what I would term a runway on the top of that, of this fibre brush, where the fruit passed from one to the other. This plate was standing horizontally. The fruit came on top of it. As it passed from one place to another it had to go through this thing. As I recall they had a roller elevator coming out of the soaking tank which brings the fruit up and delivers it on top of the washer. That washer had brushes of the horizontal plate. The brushes were damp or wet. I do not know if water was playing on them. The plate was not immersed in the water. The brushes were kept wet. They had to spray them in order to keep them wet. I could not say if that was plain water playing on the brushes. I stated a minute ago that I did not see him put any borax in it.

The Court: Was this Pond mixture borax only or was it the use of borax combined with the use of washing powder and bluestone, was it a mixture of the three or borax only? [fol. 233] I rather got the impression that it was a mixture of all three and not borax alone.

The Witness: Not necessarily. I made the statement that some of the packing houses when they had this fruit were using Gold Dust or some other washing powder.

The Court: But I thought you said to me that Mr. Pond's statement to you had to do with bluestone and washing powders as well as borax.

The Witness: We discussed those at this time.

Redirect examination:

At the time Mr. Pond and I were discussing borax, he was using borax, but as to whether or not he was putting washing powder in with it I do not know. I do not remember anything about that, but I was discussing blue mold decay with him and it was in that connection that he said he was using borax.

There was talk of spores and fungus around the packing-houses.

I do not recall whether it was before or after this conversation, that I testified to, that I made the visit to the Eustis house, because in travelling around I come to a packing house and rather stop and pass through as a matter of observation and see how things are getting along. We are all trying to improve our methods and conditions and naturally we get all corners that we could and fortunately we thought we were trying to cooperate all packing houses.

Recross-examination:

So far as I know, my brother and I are the only persons in Florida in the citrus industry having our same name. However, I understand there are some at Pandagora, but [fol. 236] I do not know what they are engaged in.

I probably have contributed articles to the technical papers or any publication in connection with the citrus industry. Only one particular instance that I know of publication, and that is the State Horticultural Society. That was published in the Florida Grower, as I recall it. I do not recall what year that was, but I think it was the year that we met in Miami, Florida, but what year it was I don't know; I am sure it was at the time we were in Miami. I have no copy of that.

SAMUEL L. HARRIS

SAMUEL L. HARRIS, of Eustis, Florida, called as a witness on behalf of the defendant, testified as follows:

Direct examination:

My initials are S. L. Harris.

I am an orange grower. I own 108 acres and have charge of about 250.

I have nothing to do now with the packing industry. I am retired.

At one time I was connected with the packing industry. That was in 1912-13, when we built a packing house at Eustis that I was connected with. I was vice-president of

the house and also one of the board of directors and stockholders of the house. Mr. F. S. Pond was our manager for the two first years. He was there the first two years. As I recall, it was in 1912-13. It might have been 1913-14, it was right along there, but I think out in 1913.

If we built a house in 1912 he was there in 1912 and 14, that is, the two crops or two years. If we built the house [fol. 237] in 1914, he was there in 1914-15. I just do not know the dates. The records are all destroyed and I will have to give it all from memory.

I did not have any part in the active running of the houses, i. e., nothing except hiring the management. I was director and vice-president. I was about the house a good deal. I was familiar with the way the fruit was packed in the house. I can describe just how the fruit was packed there.

The fruit was picked in crates and hauled to the house by teams, and in those days we had no trucks. Unloaded, trucked into the house, and stacked up. Then when the packing started it was dumped into a big vat, washing vat, and the oranges washed there and conveyed there by rollers out of the vat up onto the brushes, the washing brushes, the brushes that took the dirt off. From there to the polishing brushes along the carrier or rollers into the drier and from the drier down back to the sizers and packed.

I only knew what Mr. Pond told me himself about what Mr. Pond used in the vat that I have described besides plain water. He told me that he used borax and he told me he used the borax to prevent decay. I know that he used something else in the water.

He said he used washing powder to break the water. The water in Eustis is a little hard and the wells are very deep and he told me that he used some kind of washing powders to soften the water in order to take the mold off.

The fruit at that time was much affected by this white fly. It was the worse period we had in our section.

I do not know the name of this washer that was used there.

We sent Mr. Pond to California and he bought the entire packing machinery in California and shipped it to Eustis as a California product, whatever it was. It was a flat disc [fol. 238] that revolved around a ring and the name of it I have really forgotten.

We did not think that packing house machinery was as up to date in Florida at that time as it was in California.

We sent Mr. Pond to California.

We had a number of visitors at the plant at the time and at the packing house. It was my duty to show them through when I was there. I did show a number of visitors through. When I showed them through I described the process to them. I recall that I described to them the use of this borax. When we came to the vat I always did. I remember that distinctly. I told them that the purpose of the borax was to keep down decay.

As an officer of the packing house I kept myself informed as to the shipping qualities of our fruit every day. I got this information from the bulletin. The bulletins showed us very little decay; in fact, we at that time has less decay than any house in the State.

These bulletins show the decay of all the houses in the State. The bulletins came from the Exchange. They showed the decay in all the Exchange houses in the State, and they do today. The same bulletins were used then that are used today.

And as to how our fruit compared with others in the vicinity we led the State. We led the whole State.

I continued as a director for four years. Mr. Pond was there two years and then we hired another manager for two years and then we sold the house. I have had no connection with it since that time.

The Eustis Packing Association is not in existence now. After operating the house four years we sold the house, and then the association went independent.

I never saw the borax put in the tank. I know what time of the day it was put in.

The water was changed in the tank once a day.

[fol. 239] Sometimes I was down at the packing house early in the morning and sometimes I was not. I always went home at quitting time.

It is my information that the tank lasted one day and when the operation was shut down at night that tank was flushed, washed and refilled with borax put in for the next day's operation, and I was not there at that time of the day; I was always gone. I never saw the tank filled with anything at all.

It seems to me that that washer must have been about eight feet long with two rows of brushes that revolved to each other and I just do not remember how many of these flat brushes the washer had. They were like a lot of discs revolving in two rows with water sprinkled over them to keep it wet.

The orange came out of the vat on to the rolls, down to the vat in what they call a roller elevator. The oranges were kept on top of the brushes, were kept from being thrown off on the side by——

As I remember there were two long brushes that revolved on each other along there, that is the way I remember it. They were cylindrical. The brushes along the side kept the oranges in, that is the way I remember it, something like that, anyhow.

Cross-examination:

I was vice-president of the Eustis Packing Association during this time Mr. Pond was there. I was vice-president and one of the directors. I had to look after the management and anything that came up before the board of directors. In case the president was not there I had to act in his place.

I did have something to do with the purchases. I don't remember ever purchasing borax. Mr. Pond did that. He went ahead and spent money without authorization. He spent money and then we passed on his bills. I do not remember any bills for borax.

[fol. 240] We had a great many visitors to the plant while Mr. Pond was there, and Mr. Pond asked me to take the duty on myself to show visitors through the house and I did show them through. I showed thousand of them through, great swarms of them through, while Pond was there. I made it a regular practice to explain to visitors this use of the borax.

I remember there were quite a bunch of Government men among that swarm of visitors that I explained all this to. I could not give you any names except our Canada agent; I do not know any of the Government men's names now.

I did show newspaper men through and explain all this to them. All this showing through extended over that two

years from time to time. Those newspaper men wrote up articles about our house and its operation. We had quite a number of good write-ups. None of them talked about borax, so far as I know. I do not remember that.

Some of the other packers and growers in Florida went through the house. I do not know whether I could tell you any names.

The packing house people visited the house, and I explained to them all about this borax when I showed them through.

There was one time in those two years when we had some five thousand people there from all over the State.

We had a barbecue when we first opened. It was estimated that about five thousand people were there.

They all went through the house, I took as many through as I could. I was there all day. We had the house in operation that day.

Mr. Pond took pains about handling the fruit carefully in the house. He took every precaution that he could. He saw that the stems were cut short. If he found any long stems in the box, we called the picker back and showed him [fol. 241] how many long stems he had, and we brought him back next time, if he got six, he was fined. We hauled the fruit in from the groves in with teams at that time on springs.

No fruit was allowed to go to that house, not a load that did not have springs under it. In some of the packing houses they were more careless than that, and they brought the fruit in from the groves in wagons that did not have springs.

Everybody wore gloves, pickers, packers, handlers and all. We saw to it with particular precaution that the oranges were not dropped. We did have inspectors watching the people in the field, so as to see that they were careful.

One of our advertisements or one of the advertisements of ou. house, was that the naked hand never touched the orange. We took every possible precaution to see that no oranges were shipped except those that were absolutely sound in very respect. Culling was done very carefully.

In the washer or the place where the brushes were operating upon the oranges, there was water running on to the

brushes out of the pipe with holes in it, something like the Skinner system of irrigation. That was so as to get everything off the surface of the orange.

We had a sign up in that packing house at that time reading "Every doubtful orange a cull." I remember that distinctly. We took pride in treating our fruit more carefully and getting the better grade of fruit through our packing than other houses did.

(Witness is shown page 10 of the issue of the Florida Grower of May 23, 1914, which is Plaintiff's Exhibit No. 28, and is asked if that contains a picture of this Mr. Pond that he had been talking about.)

(Handed paper.)

Yes, sir, that is him.

[fol. 242] Redirect examination:

I do not think I remember this article in the Florida Grower that Mr. Neave just showed me. It has been so long that I took the Florida Grower at that time.

(Witness is asked to look at it and see if that picture down there is a picture of the house.)

Yes, sir, that is the picture of the house. I have no recollection of reading the article. I do not at this time; that is the house all right, and Mr. Fuller there.

ALFRED R. SANDLIN

ALFRED R. SANDLIN resumes the stand.

Recross-examination (continued):

(Witness is shown a copy of the proceedings of the Florida State Horticultural Society for 1921, on page 173, of which there appears to be an article entitled "Problems in Shipping Citrus Fruits, by A. R. Sandlin of Leesburg," and is asked if he is the Mr. Sandlin that wrote that article.)

I presume so. I do not know of any one in the state by that name. I remember writing that article.

(Article is received and marked "Plaintiff's Exhibit A for Identification,")

Redirect examination:

I recall writing this article. I am sure it is my article. I wrote an article as I stated a while ago. I do not recall the year in which that article was written, but I presume it is the same article.

That is the only one I recall writing that was ever published in the minutes of the proceedings of the Agricultural Society so far as I know.

[fol. 243] WILLIAM T. DU PREE

WILLIAM T. DU PREE, called as a witness on behalf of the defendant, testified as follows:

Direct examination:

My initials are W. T. I am a citrus grower. I have had some connection with the packing industry as a packing house man. My first connection with the packing industry was in 1913. I was in a packing house at Citra, Florida. I have been there continuously since then. I am still manager there. I knew Mr. F. S. Pond, who was manager at Eustis.

Mr. Sandlin, A. R. Sandlin was sub-exchange manager, and upon his suggestion I paid a visit over to Mr. Pond's packing house. I think it was in February, 1915.

I think the hotel register at the Grand View Eustis Hotel (Citra), shows my registration. I have looked at it recently. It bears my signature on that date.

I cannot recall registering at the hotel at Eustis before or since. I may possibly have. I cannot recall it. Citra is around seventy-five miles, I presume, from Eustis.

I reached Eustis and had lunch at the hotel with Mr. Pond and a man named Marketboro, and I left them that day, I cannot recall whether the hotel was crowded or not, and I left and was gone a couple of days and came back and then spent the night at Eustis. I did visit the packing house when I was there.

The first day the packing house was not in operation. The next day it was operating. On my visit the first day the machinery seemed to have some kind of—to be incrusted with some material—and I asked Mr. Pond what it was. He told me it was borax. He stated that he put borax in the water, in the soak tank. I do not recall his telling me how much borax he used. I cannot recall whether he told me [fol. 244] or not how much borax he used.

Well, I just cannot recall what brought this visit to Eustis back to my recollection as several have asked me about my going there. Mr. Sandlin mentioned the fact that I had gone there and I went to pay him a visit to see if I could recall our conversation but I could not, but then it recalled to my mind the visit that I made to Eustis upon his suggestion. It was only an invitation you understand from Mr. Sandlin.

We have used borax in our operations this year. I use a solution of about approximately 1½ per cent., 1¼ per cent. to 1½. You are sure by doing that not to leave any dust on the fruit. That has been my observation. The machinery gets incrusted with it. As I recall it, Mr. Pond's machinery looked similar to ours at the present with this incrusted borax on it. We were using caustic soda in the soak tank at Citra at that time ourselves.

It (caustic soda) softens the water and cuts the white fly damage from the fruit easily, and it seems to have some preservative, at least I am not sure there, of course. We did use it consistently at Citra, i. e., every year since 1913. We use it now.

I did not keep track of the decay records that were published by the exchange at that time. However, it was the general talk among the packing house men that Mr. Pond was having a good deal of success; that is, he was having less decay than the average houses. I know that Mr. Pond, I recall that Mr. Pond asked me why I was so interested, as I was getting by pretty good, and he asked me what I used. As I recall the conversation that was the only general conversation as I recall. I told him then about caustic soda.

We used approximately six or seven pounds of caustic soda in our tank at that time, but we had an awful large [fol. 245] tank. I do not know just how much it would hold of water, but it was a good large tank, and I only put in the

amount we learned to put in by feeling of the water, that was only just a matter of guesswork you might say.

I seemed to think that it helped us as regards decay. I am not sure. Our decay was somewhat less than some of the other houses in my immediate section. I do not recall how our decay compared with Pond's.

Cross-examination:

We market our fruit through the American Fruit Growers and have done so for a few years.

At the present time, in the treating of our fruit, we use a soaking tank first. Our tank is about 4 feet, I guess, in width, and possibly 16 feet long.

It is about 20 inches deep, I think. We have an overflow pipe that takes water from the top, about an inch from the top, or two inches, so that the water is about 18 or 19 inches deep. I do not put any borax in the tank. I spray it on with a small centrifugal pump after the orange gets through the washing.

The fruit is elevated out of this soak tank to the washer. We are using a Skinner washer that is made by the Skinner Machinery Company. The fruit then comes out on a roller conveyor about possibly 6 feet, I guess, and it has a roll of pipes over it, and we just sprayed this solution down.

We have a small tank setting to one side and this solution drains back over these rollers to a tin underneath, a drain, and that runs back and is repumped again.

[fol. 246] The American Fruit Growers have absolutely no interest in our house. They do not supervise our operations at all. We are using caustic soda now. We put that into the soak tank. I presume we put in now about 5 pounds. Yes, we have—you understand—we have rebuilt some from year to year and when I put in more than that, there was a larger tank still.

I said that we have some incrustation on our machinery now, the incrustation is on the driers. Of course everything is wet up to that time. The borax is in solution you might say.

On this one visit I made to Citra was the first time I met Mr. Pond and that was the only time. That visit I

think was in February, 1915. I am sure Pond was there at that time. I could not tell you how long he stayed there after that time. I could not tell you how long he was at that house altogether.

I said I did not register in any hotel at Eustis except that one time. As I recall I have never registered there before or since. I have driven through the town since. I have been over there to meetings and trap shoots for a few hours, but I do not recall spending the evening or night since. That is the only time I went through that house.

At Pond's house he had a soaking tank. I do not know what the size of that soaking tank was. As I could recall, I would say possibly 3½ feet wide and 14, 16 feet long, something like that, probably 18 or 20 or 22 deep. I never saw anything put in that tank.

The oranges then passed through that soaking tank, and then were conveyed up to the washer. Pond was using a disc washer, if I have the name correct it is called a Limonier Patent. I cannot recall if the water was playing on these brushes. I can not recall that at all. As to the part of the machinery that I saw at Pond's incrusted with some whitish material, I noticed it on the drier simi- [fol. 247] lar to our own. I did not know what was in that water that Pond was using in his soaking tank. We never have used washing powders.

We never have used bluestone. We put the caustic soda into our soaking tank every morning. Every night this tank is scraped out and the false bottom turned out, cleaned out, and some water pumped in, what time we have before closing down, the next morning it is finished. Occasionally if the water overflows very much we do add a little caustic soda during the day.

We began using borax in our house this year; this season. We never used it before that.

Redirect examination:

As I recall his tank was empty or partially empty the day his house was not in operation; I can not just recall that exactly.

Mr. Pond described in detail his packing operation to me at that time. We rode around in different groves and

he was free to tell me how he kept down decay and he was a man that carried a great deal of information.

As I understand he kept telling me that it was the borax solution that kept down his decay.

Recross-examination:

I knew he was very careful in his packing and picking and handling.

Mr. Morton: We have the hotel register here.

Mr. Neave: It is not necessary so far as I am concerned.

Mr. Morton: I did not think it really is evidence. That is all, Mr. Dupree.

[fol. 248] EDWARD L. MARKELL

EDWARD L. MARKELL, called as a witness on behalf of the defendant, having been duly sworn, testified as follows:

Direct examination.

By Mr. Morton:

I am a district sales manager for the American Fruit Growers at Sanford, Florida.

I was employed by the Department of Agriculture, commencing in 1913 and running until 1919. I was employed all over the country doing investigating work. I was in Florida in the fall and winter of 1913-14 and again in 1914-15.

I was with the Bureau of Plant Industry, Division of Horticulture and Pomology, pomological investigation. It was the same division and the same work that Dr. Powell and Stubenrauch and Ramsey were engaged in, but Dr. Powell had resigned when I was with the Department. It was the work which has been designated as the careful handling campaign of the Department.

The work that had been covered or has been covered by the bulletins concerning the careful handling of citrus fruit had largely been completed at the time I entered. There was some of this work that was still going on and in fact was continued for the next two or three years. We had

this careful handling work, that is, careful picking, packing and compared that with the commercial handling, but laid particular stress on the fact of refrigeration of carefully handled fruit as compared with commercially handled. It was exactly the same type of work that was undertaken earlier.

The purpose of the work was to reduce the losses of fruit through care in picking and packing. My work did not involve in any way the use of chemical treatments for the fruit.

[fol. 249] By Mr. Morton:

Q. At that time, what would have been the necessary procedure to have started an investigation involving the use of chemicals on fruit after it was gathered?

A. To the best of my knowledge it would have been practically impossible for our division to have attempted anything of that sort. The use of chemicals in any form was outside of the scope that we were doing, that is, the work of the transportation storage investigation, careful handling investigations.

In order to investigate the use of chemicals, that is a problem that would have had to be referred to the Bureau of Chemistry.

Q. Do you know whether or not it was the rule of the Department at that time that matters involving chemistry had to be handled through the Bureau of Chemistry?

A. Absolutely. It would have been impossible for us to have secured an appropriation to purchase chemicals to make any investigation with the use of chemicals.

Dr. Alsberg, I believe, was in charge of the Bureau of Chemistry at that time. Dr. Alsberg succeeded Dr. Wiley. My recollection of the time Dr. Wiley left the Department is a little vague; I am not sure about that, but I should say possibly around 1910 or 1911.

In so far as reducing decay was concerned this careful handling campaign of the Department of Agriculture was very effective as is borne out by the various publications and bulletins issued by the Department of Agriculture. The result was to reduce the decay tremendously.

I have conducted some tests recently to determine the effectiveness of different concentrations of borax solutions on citrus fruits.

[fol. 250] In order to get some very definite information in a relatively short space of time we took some fruit, ordinary fruit, from the packing house and injured it artifically and inoculated it with blue mold and then treated it with solutions of borax ranging from one half of 1 per cent to 5 per cent in water or ordinary room temperatures.

By the Court:

Q. 22. Five per cent?

A. Yes, from ½ to 5 per cent.

The Court: From ½ to 5 per cent.

The tests started in the early part of September, 1926, running up to the present time. As a matter of fact, we are still making some of these investigations. We injured the fruit and inoculated it, so that we were sure that it was inoculated with the disease organism and so that we could get the effects of the borax treatment very quickly.

We made a few tests in which we did not inoculate the fruit, and the reason why we did not make it to start with, which was borne out by those tests, is that the results are too slow. It would have required a large number of tests extending over a long period of time to have accumulated the same information that we got in a comparatively short space of time.

This chart which I prepared myself (Deft.'s Ex. 8) shows graphically the effect of the treatment of artificially injured and inoculated fruit with varying solutions of borax at ordinary temperatures. That is, temperatures of around 75 degrees F.

These long, shaded diagrams indicate the amount of decay in fruit that was injured and inoculated, but that had no borax; that was treated with plain water without any borax, and this first column covers the condition five days after treatment. The fruit that was treated with plain [fol. 251] water without any borax showed an average in the neighborhood of 72 per cent decay. The fruit that was treated with ½ of 1 per cent borax showed an average of

about 44 per cent decay. And the 1 per cent showed an average of about 15 per cent decay; 1½ per cent, 6 per cent decay; and 1¾, 2 per cent decay. The higher percentages showing no decay five days after treatment.

The next column shows the decay after the period of seven days; seven days after treatment. This next group, ten days after treatment; and the last group thirteen days after treatment. And thirteen days after treatment the fruit that was treated with plain water without any borax in it, had totally decayed, 100 per cent. The fruit treated with ½ of 1 per cent. of borax had decayed to the extent of about 88 per cent.; 1 per cent., about 60 per cent. decay; 1½ per cent., in the neighborhood of 30 per cent. decay; 1¾ per cent., 20 per cent.; 2 per cent. borax showed about 10 per cent. decay. 3 per cent., 6 per cent. decay, and the 4 and 5 per cent. borax showed about 1 per cent. each at the end of thirteen days after treatment.

(The chart just described by the witness received in evidence and marked "Defendant's Exhibit No. 8.")

For the most part the fruit was in the solution in the neighborhood of five minutes. I do not believe that that has any particular bearing. The length in the solution does not make any difference.

By Mr. Morton:

Q. 32. Why do you say that the length in the solution makes no difference, Mr. Markell?

A. That is partly theoretical and partly based on incompleted experiments that we have been making showing that —well, theoretically, after the fruit—if it is just dipped into the solution and removed instantaneously, it is covered with the solution, and if there are any breaks in the skin or [fol. 252] wounds on the fruit, it soaks into those spots, and I do not think that leaving it in for four or five minutes or half an hour would make any material difference. That is at ordinary temperatures.

Q. 33. Just how do you inoculate this fruit? What is the procedure of inoculating it?

A. Just in order to make it uniform, we used a piece of wood with a nail driven through it, and made a scratch mark or an X mark on each side of the orange extending into the

skin of the orange to the depth of possibly a sixteenth of an inch, and the fruit was inoculated then—it was injured in that manner and inoculated by the experimenter, putting his fingers on fruit covered with blue mold spores and rubbing it into these injured places.

Q. 34. Fruit scarred in that manner would not be considered commercial fruit under any circumstances, would it?

A. Oh, absolutely not.

These oranges on the table there came from Sanford, Florida. Those oranges were dipped in a solution of borax of the strength of one ounce of boracic acid to one gallon of water and allowed to remain at that ordinary temperature around 75 degrees, and they were allowed to remain in that water about five minutes. They were removed and dipped in a solution of gelatine, plain ordinary Knox gelatine, of a sufficient consistency to cover the surface. Day before yesterday this orange was washed clean of the gelatine, that is all.

The treatment with boracic acid and gelatine was made Saturday before last. That is about ten or eleven days ago—twelve days ago. The oranges were inoculated before treatment. They were all slightly injured at the stem end and inoculated there with blue mold. At the same time I similarly inoculated another lot of oranges to which I did [fol. 253] not afterward give the boric acid treatment, but did use the gelatine treatment on them. Boric acid and boracic acid are the same. The names are used interchangeably.

By Mr. Neave:

Q. 43. There is a difference between borax and boracic acid?

A. Yes. I inoculated one dozen oranges and treated with the boric acid and later with the gelatin. I brought the whole dozen with me. When I opened them up this particular lot showed two oranges on which the decay was just starting. I brought along the checks also and when the box was opened they were all decayed.

Cross-examination.

By Mr. Neave:

X Q. 49. Are you a chemist, Mr. Markell?

A. No, sir. I am not a chemist, but I have had a general chemical training at college, such as most college students have.

X Q. 50. You have spoken of the Bureau of Chemistry; is that a branch of the Department of Agriculture?

A. Yes, sir.

X Q. 51. And Ramsey was in what department, the Bureau of Plant Industry, I think?

A. He was in the Bureau of Plant Industry.

X Q. 52. And Fulton, do you know Fulton?

A. Fulton was in the Bureau of Plant Industry in the Fruit Disease Investigations.

X Q. 53. Not in the Chemical Division?

A. No.

X Q. 54. And Barger?

A. And Barger was also in the Bureau of Plant Industry; in the Fruit and Vegetable Disease Investigation.

[fol. 254] X Q. 55. And Winston?

A. Also the same.

X Q. 56. I have here a publication dated in 1912, Plaintiff's Exhibit No. 20, by H. J. Ramsey; he is the one we have been speaking of?

A. He is the same.

X Q. 57. And he states in this publication:

"That the question is often asked whether any chemical can be put into the wash water to kill the blue mold spores in it or on the fruit. Considerable work has been done along this line, and nothing has been found that can be put into the water which will kill the blue mold spores and not injure the fruit."

Are you familiar with that?

A. I am familiar with it, just from having heard it read before during this proceeding. I doubtless have seen that bulletin and read it, but have no first-hand information on it.

X Q. 59. Are you familiar with the fact that in October, 1923, Winston, Fulton and Barger wrote an article, Plaintiff's Exhibit No. 41, in which they state that chemical disinfection in the soaking tank has not been effective?

A. I am not particularly familiar with that publication, but I do not doubt it is correct.

X Q. 60. Are you familiar with the Fulton article of 1925, Plaintiff's Exhibit No. 49, which says:

"That for a long time fruitless search has been made for a satisfactory chemical agent which will control those things."

A. I am not familiar with it but doubtless it is all right.

X Q. 61. So that these people in the Bureau of Plant Industry seem to have been doing a good deal of work on chemicals?

[fol. 255] A. They did in the Fruit and Disease Investigation. That was in line with their work, but it was not in line with the work of Powell, Ramsey or Stubenrauch.

X Q. 62. And Ramsey talks about chemicals here?

A. It is merely hearsay on his part.

X Q. 63. Oh how do you know that?

A. Because I was associated with him.

X Q. 64. Not in 1912?

A. No, but after that.

X Q. 65. After that. The publications I read were in 1912. Now, about these tests that you said you made inoculating the fruit with blue mold spores and then treating with the borax solution, before you inoculated the fruit, it was cleaned, was it, or was it clean?

A. The fruit was just as it came from the groves.

X Q. 66. Just as it came from the groves?

A. Yes.

X Q. 67. Was it clean or was it not clean?

A. Well, it had not gone through any cleaning process. Some of it had a certain amount of soot or other discoloration. It had not gone through a bath.

X Q. 68. Now, how did you make up your borax solution?

A. By weight, using, for instance, in order to get one-half of 1 per cent., ten pounds of water, which is 160 ounces, eight-tenths of an ounce of borax to make one-half of 1 per cent.

X Q. 69. Where was this work done, in a laboratory?

A. In a temporary laboratory erected for the purpose.

X Q. 70. In California?

A. No. In Haines City, Florida.

X Q. 71. In Haines City, Florida?

A. Yes.

X Q. 72. And what water did you use?

[fol. 256] A. Ordinary spring water down there.

X Q. 73. Have you any idea of the character of that water?

A. Why, it seemed to be a fairly soft water. Aside from that, I did not have it analyzed. I do not know.

X Q. 74. You did not make any tests of it to see what its character was?

A. Did not make any analyses of it.

X Q. 75. How after inoculating the fruit did you subject it to the borax solution?

A. How soon after?

X Q. 76. No. How did you do it?

A. We used pails. The solution was in the pails, and we simply left the fruit in there for a period of about five minutes. We removed it from there and put it on drying racks and permitted it to stay there until it was dry.

X Q. 77. Did you just put the fruit in and leave it in, or did you mix it around in there?

A. Put it in and pushed it down in it so that was covered, so that it had been covered once at any rate.

X Q. 78. And then it would sort of float up to the surface?

A. Yes.

X Q. 79. And how long did you leave it in that solution?

A. About five minutes. We used that five minutes just simply to make the experiments uniform.

X Q. 80. You have spoken here about those oranges that you had coated with gelatin, two of which you produced, and from one of which the gelatin had been subsequently removed; how did you make up that gelatin solution?

A. I made up a solution of in the neighborhood of a pound of gelatin, dissolved first in one pint of water, and that made such a very thick gummy mass that it was not suitable [fol. 257] for this purpose at all, so I diluted it down somewhere in the neighborhood of one gallon of water to a pound of gelatin.

X Q. 81. Why was not that first that you made, suitable for this purpose?

A. It was too thick.

X Q. 82. Why was it too thick, what indicated it was too thick; too thick to do what?

A. It was too thick to spread evenly over the surfaces of the oranges. As a matter of fact, if I had put the oranges in that solution, they would have had a layer of gelatin on

them of about at least a quarter of an inch thick, maybe half an inch thick, in fact it would have run down and settled around the base of the orange and left a mass there.

X Q. 83. So you added more water so as to make a thinner gelatin solution?

A. Yes.

X Q. 84. And how hot did you make this gelatin solution?

A. I should say in the neighborhod of 100 degrees.

X Q. 85. How hot did you have that thicker solution that you did not use and thought that it was not suitable?

A. I did not use a thermometer. It was unquestionably higher than 100 degrees.

X Q. 86. And how often did you dip the orange into the gelatin solution?

A. Only once.

X Q. 87. Only once?

A. Yes.

X Q. 88. If you had gotten a layer a quarter of an inch thick, would you have thought that was suitable for the purpose?

A. Absolutely unsuitable for any commercial purposes.

[fol. 258] X Q. 89. What would it have been so far as the blue mold rot was concerned?

A. The gelatin by itself?

X Q. 90. No. The gelatin after the borax treatment.

A. I do not think the gelatin has any bearing on the blue mold at all. I think that the borax would have controlled the blue mold perhaps, and the gelatin had no effect.

X Q. 91. Do you think if this thick coat of gelatin was made of a quarter of an inch coat of gelatin on there, would it have made the orange rot, for any cause, irrespective of blue mold?

A. I do not think so.

X Q. 92. Never tried it?

A. Not with the thick coating.

X Q. 93. That is, you have not tried it with the thick coating?

A. No.

X Q. 94. Do you know what it is that borax does to an orange or to the blue mold spores, that prevents that blue mold decay setting in?

A. I think it does two things. I think it enters the injured place, and affords a medium in which blue mold spores will not germinate; that it has a tendency to preserve the tissue in those spaces, and blue mold will only develop in a dead tissue, and also I believe it has a tendency to kill the blue mold spores.

X Q. 95. It acts just like any other germicide or fungicide?

A. The various fungicides have different actions. Some of them will not kill, but simply retard the development of spores.

X Q. 96. Do you consider that the action of the borax in preventing blue mold decay is a well understood action?

A. I do not think it is any too well understood, no.

[fol. 259] X Q. 97. What is there that is abstruse about it?

A. Are you referring now to the technical man who really makes a study of it, or to the general public?

X Q. 98. To the technical man who really makes a study of it.

A. I do not think it is abstruse to him. I misinterpreted your first question.

X Q. 99. Is there a man named Fawcett; do you know anybody named Fawcett?

A. I do not know him. I have heard of him. He is a plant disease investigator, I believe.

Mr. Morton: May it please your Honor, this is going outside the examination, about things that the witness knows. I want to object on that ground. It is not in the direct examination.

Mr. Neave: I had not supposed so, because he has been testifying here about what he has been doing on his blue mold, and what he has done.

The Court: Up to now, I think it is only this immediate question about a man named Fawcett that the objection is directed to. Is that right?

Mr. Morton: Principally to this one. I did not object to the inquiries about the other men, and that sort of thing.

Mr. Neave: I will ask one more question about Fawcett then.

The Court: I will overrule the objection, as I do not know where this question is leading, but you may object to the question now put if it is improper.

Mr. Neave: That leads merely here——

X Q. 99a. I have before me a book of Howard S. Fawcett, Professor of Plant Pathology—he is at various places, [fol. 260] University of California, and other places. The book appears to have been published in 1926. Here he states that "borax has recently come into use in connection with prevention of decay, and that borax is not a strong disinfectant in itself as compared with many other substances, but it seems to have some influence not entirely understood on the rind of the fruit which enables the solution to prevent the development of some of the decay brought about by the blue and green molds, especially the latter." Do you agree with that, or do you think the action is entirely understood by the technical men?

A. Mr. Fawcett demonstrates right there that it is not thoroughly understood. His opinion on that subject is a whole lot more valuable than mine.

X Q. 100. His is more valuable than yours?

A. Oh, I should think so.

By the Court:

Q. 101. Could you say how soon after that accumulated? I think you did state but I have forgotten it.

A. Almost immediately.

Mr. Neave: May I ask another question?

The Court: Yes.

By Mr. Neave:

X Q. 102. You said a little while ago, as I understand it, that if you had a layer of a quarter of an inch of gelatine it would not be a commercial fruit. Take this orange that you have here with a layer of gelatine on. Is that commercial?

A. I do not think it compares very favorably with fruit handled in the most approved commercial methods at present known.

X Q. 103. You could not sell it at all, could you?

[fol. 261] A. It would be difficult to sell.

X Q. 104. The coating is sticky; the gelatine came off where it has been standing on the paper, has it not?

A. That came off when it was first removed from the board on which it drained. That is, the gummy mas accumulated there and stayed on the board.

X Q. 105. It is sticky now, is it not?

A. Yes, somewhat. The moisture of the hand makes it feel sticky.

X Q. 106. Well, the paper has become attached to it, has it not?

A. It was wrapped in it before it got dry, thoroughly dry.

Mr. Neave: That is all.

The Court: We will take a recess until two o'clock.

After Recess

X Q. 107. You have presented here some charts showing the effect of borax of different strengths?

A. Yes, sir.

X Q. 108. At what temperature was that borax solution used?

A. It was used at ordinary temperature. I took the temperature of the water on several occasions and it was in the neighborhood of 70 degrees, 70 to 75.

X Q. 109. For all of those tests?

A. Yes, sir.

X Q. 110. The water was uniform throughout?

A. Very nearly with every slight fluctuations.

X Q. 111. You presented here two oranges, one of which had a coating of gelatin on. Before you put that coating [fol. 262] of gelatin on, you, I think said, that you treated it with a solution of something. What was that solution, was it a solution of borax?

A. A solution of boracic acid.

X Q. 112. I thought in connection with that you said something about borax?

A. If I said anything about borax, it was merely a slip. I do not recollect saying anything of that sort. It was boracic acid.

X Q. 113. Boracic acid and water?

A. Yes, sir.

X Q. 114. And what was the strength of that solution, the boracic acid?

A. One ounce to one gallon of water.

X Q. 115. And is the boracic acid a powder?

A. Yes, sir.

X Q. 116. I understand that borax is a well-known water softener, is that right?

A. Yes, sir.

X Q. 117. That has been known for a great many years?

A. I think so.

X Q. 118. And it is very largely used as a water softener?

A. I am not in a position to testify on that subject. I really do not know how widespread its use is.

X Q. 119. What is the idea in softening water, why does one want soft water, why should one want it?

A. Because it cleans more readily.

Mr. Neave: That is all.

Redirect examination:

By Mr. Morton:

R D Q. 121. Please state if you know what action takes place when water is softened by what is known as a softening agent?

A. The chemical action?

[fol. 263] R D Q. 122. Yes.

A. I do not know very much about the chemical reaction. I know the physical results, and that is it makes water that feels what we term hard to the touch feel soft or slippery.

R D Q. 123. Did you find time during the recess to look over this bulletin, "Commercial Control of Citrus Stem-End Rot," being Plaintiff's Exhibit No. 41?

A. Yes, I did.

R D Q. 124. From which Mr. Neave read?

A. Yes.

R D Q. 125. I call your attention to the sentence which he read on page 8: "Chemical disinfection in the soaking tank has not been effective." Does that refer to a suggested process for taking care of blue mold or for something else?

A. I misunderstood the question when it was originally presented. It refers to stem-end rot and not blue mold.

R D Q. 126. I call your attention to a footnote at the bottom of page 2 of this bulletin, relating to blue mold rot, will you please read that?

A. Aloud?

R D Q. 127. Yes.

A. "Blue-mold rot—Besides the two types of stem-end rot, pencillium (blue mold, green mold, blister rot) is a common cause of decay. It can develop at lower temperatures than Phomopsis. It may enter at any point where the skin of the fruit is cut or bruised. Its development is very rapid, the primary infections showing as a rule within two or three days after entrance occurs. It requires different procedures for control from the stem-end rots. Briefly, the fruit must be kept free from bruises and scratches of all kinds and from long continuance of surface moisture—from rain or dew, from washing, or from condensation (sweating)—and it should be held at low temperatures (40° to [fol. 264] 45° F.)." I call your attention there to the statement that it requires a different procedure for the blue mold rot, and this bulletin is directed to stem-end rot.

The Court: What is that paper?

Mr. Morton: This is the Winston, Fulton and Bowman Bulletin on Stem-End Rot.

R D Q. 128. What was your education, college education, Mr. Markell?

A. Do you mean what college did I go to?

R D Q. 129. Yes, and what course did you take?

A. I went to Cornell University and specialized in agriculture.

R D Q. 130. Did you take a degree from Cornell?

A. Yes, I did, degree of bachelor of science in agriculture, specializing in fruit and fruit growing.

R D Q. 131. Is gelatine, such as you used on the oranges which have been introduced here, readily soluble in water.

A. Yes, it is very readily soluble.

R D Q. 132. And washes off easily?

A. Very easily.

(Witness excused.)

JOHN R. WINSTON

JOHN R. WINSTON, a witness called on behalf of the defendant, being first duly sworn, testified as follows:

Direct examination.

By Mr. Morton:

I reside at Orlando, Florida, and am at present engaged in the manufacture of insecticides and fungicides. I am the John R. Winston whose name appears on this bulletin, [fol. 265] Department Circular 293, Plaintiff's Exhibit No. 21. I was employed by the Department of Agriculture at that time. My employment with the department began in March, 1916, and lasted nine years. I was employed during the greater part of that period. I was in Florida usually between November and June, which is the citrus season, Washington between June and November, which is the off-season. This work which is described in this bulletin is in part mine.

In 1918 there was a rather severe outbreak of stem and rot of citrus fruit, and quite a number of requests came to the department from growers in Florida asking that some special investigation be made on this disease at once. We proceeded as rapidly as possible on the problem.

That was during the war and labor conditions were rather bad; fruit was handled roughly, unusually so, and transportation was slow, oftentimes three or four days, five or six days would be consumed between the time of picking and shipping the fruit, ordinarily not more than two days after shipping the fruit should be consumed. Sometimes ten days, two weeks or more would be required for the car to get to the market, usually not more than four or five, six days to the average eastern market, a general slowing up all the way through. That slowing up resulted in a bad outbreak of this stem-end rot. My work of investigation on stem-end rot began, I should imagine, about October of 1918.

I am quite certain it was before the war was over. I was taken ill late in October after I had gotten down to Miami and started to work—gotten to Florida and started to work.

Stem-end rot is caused by either of two fungi, Diplodia natalensis or Phomopsis citri. The former causes only one disease, namely, stem-end rot; the latter causes the Mela- [fol. 266] nose disease of the fruit, as well as the stem-end rot. The germs which cause the stem-end rot enter the fruit through the stem.

Before we began the investigation, we knew that the stem-end rot was caused by these two fungi. We first made a series of culture experiments to determine which of the two fungi predominated and we found from this culture work that at certain seasons of the year, namely, when the temperature is rather high, that this Diplodia Natalensis occurs more often than the Phomopsis citri. As soon as the season advances and the temperature is lowered somewhat, the Phomopsis citri fungi are the predomina/e ones. After we finished that phase of the work, we took up the question of spraying, orchard spraying, to see if the disease could be controlled by spraying the orchard. Then we took up the matter of disbuttoning the fruit, which is the removal of the button or stems from the fruit before the fruit is packed. Then we studied over the matter of refrigeration, the effect of temperature on the development of the disease. In fact, we covered almost every conceivable angle.

When making the studies of the effect of these fungi on the fruit, we had occasion to make shelf tests with a very large number of fruit. We conducted some three or four thousand tests.

In general, when conducting one of these tests, we would go into the grove and get fifty oranges and put them into a tray and set them on the shelf and observe them every three days and we would take out the decaying ones and make cultures to determine the cause of the decay and leave the sound fruit on the shelf to be observed the following three-day interval. They were held rarely less than thirty-six days, sometimes as much as fifty-four days.

These oranges which we were observing for the purpose of determining the stem-end rot causes, developed other [fol. 267] kind of citrus disease. They developed blue mold and to a limited extent some of the miscellaneous disease such as colletatrichum, and in the hot weather, whiskers, which is a common name.

The rot from other causes did not interfere with our observations to any appreciable extent, other than blue mold.

Blue mold was quite a factor particularly when we were conducting experiments as to how the fungus entered the fruit. At that time in the early stages we were pulling the fruit from the trees in comparison to clipping and the pulled fruit usually developed a fair percentage of blue mold, because the rind was ruptured at the juncture of the stem and rind. That is especially true early in the fall before the fruit is gotten dead ripe.

The blue mold decay would develop more rapidly than stem-end rot and would usually cause practically all of the decay that was going to be caused within ten days after picking, whereas stem-end rot rarely, very rarely began to show up within two weeks after picking the fruit. In other words, the blue mold would come in and practically destroy the experiment.

We took measures at that time to check the blue mold so that we could get better terminations with our stem-end rot. That time was 1920-21, starting about the 1st of November and continuing throughout the entire shipping season.

We decided upon the use of corrosive sublimate as a disinfectant, because the effect of corrosive sublimate on spores and on germs is well known to practically every one, not only the scientists but to the laymen as well. We used very weak solutions; we dipped the fruit in very weak solutions of corrosive sublimate, and that is mercuric chloride, bichloride of mercury.

That was the main material used. At the same time we conducted a relatively small number of experiments using such materials as borax, sodium hypo-chloride and lysol, [fol. 268] sodium benzoate and two or three others, I have just forgotten exactly.

Q. 37. What effect did you observe from the use of the borax?

A. The borax gave quite promising results, not perfect but quite promising.

The Court: Not what?

The Witness: Not perfect, but quite promising.

Q. 38. To what extent did you use the borax?

A. I would imagine perhaps twenty tests.

Q. 39. You got better results with the mercuric chloride?

A. Yes, on the average.

Q. 40. Mercuric chloride is a deadly poison, is it not?

A. Yes.

Q. 41. And fruit treated with that would be of course entirely unfit for market?

A. I should think so.

Q. 42. I call your attention to some charts on page 9 of this bulletin and I will ask you to explain just what they indicate.

A. Why, they indicate the effect of temperature on the development of decay on Florida citrus fruits at relatively high temperatures. Stem-end rot causes practically all of the decay—that is at the bottom—and as the temperature is raised, the stem-end rot decay decreases somewhat until you get to quite low temperatures. It also shows that as you lower the temperature, the less the total amount of decay; that there is no appreciable amount of decay at low temperatures, within fifteen days——

By the Court:

Q. 43. Which side indicates the time and the temperature, the bottom?

[fol. 269] A. The bottom line is the days, the side lines for the temperatures.

Q. 44. And what is the technical name for the stem-end rot?

A. Stem-end rot, they have two—phomopsis and diplodia. You will note at the high temperatures the phomopsis predominates. At the intermediate temperatures the phomopsis decreases and diplodia increases. At the lower temperatures the penicillium increases.

Q. 45. What do you say the penicillium is?

A. Blue mold.

The check area represents the proportion of the decay that is caused by the diplodia. And the other areas represent the decay caused by the phomopsis and the parallel lines, the penicillium.

The work which is discussed in this bulletin was concluded perhaps in the spring of 1922; I am not dead certain, but I think so. We were working with borax at Orlando during this period.

A. We were testing fertilizers with borax, to see what effect borax might have on citrus trees. The reason for that was that along about 1917 or 1918 our supply of potash was cut off from Germany, and we had to get our potash from the American fields, and our American potash carries, as I understand it, a fair percentage of borax. Along about 1918, the Indiana experiment station reported harmful effects on corn, following the use of fertilizers containing small amounts of borax. The following year, I think it was 1920, perhaps, the same condition showed up in the South on the cotton, and also on potatoes in Maine. The Federal Government conducted quite a number of experiments at that time relative to the amount of borax that a plant could really stand without showing any toxic effect. Practically all investigators were thinking borax, talking borax and breathing it. Practically every grove I went into, I was [fol. 270] looking for symptoms of borax poisoning.

We had borax around the laboratory at that time in considerable quantity.

The work we took up when we concluded our work on the control of stem-end rot was blue mold in general.

We found several things to be effective for checking this stem-end rot. Spraying would reduce stem-end rot considerably, and as a matter of fact, stem-end rot is not an extremely important disease in ordinary years, because the greater part of the shipping season the temperature is relatively low, and those diseases do not develop at very low temperatures. It is quite an important item though in Florida, early in the shipping season, and again late in the spring.

As I understand it, as I recall it, there are two or three things suggested in this bulletin for the control of stem-end rot:

"Prune the trees for removal of deadwood, in so far as good orchard practice requires. Spray the young fruit once or twice with 3-3-5 Bordeaux mixture plus 1 per cent. oil as emulsion during April or certainly before May 5

(under ordinary Florida conditions), as may be required for good melanose control. If the fruit comes from old trees with much deadwood, disbuttoning by gassing should be resorted to. Even if such trees have been pruned and the young fruit sprayed, disbuttoning will add to its keeping quality through more complete protection from stem-end rot. Keep the fruit at low temperatures, preferably between 40° and 45° F., and shorten as much as possible the time between picking and ultimate consumption."

Chemical treatment of the fruit after it was taken from the tree did not have any appreciable effect on the stem-end rot.

[fol. 271] It would be rather difficult to state definitely when we did begin the blue mold work which we took up at the conclusion of the stem-end rot. Our first experiments were conducted in the season of 1920-21. Then intermittently on up until about 1923. I would say that as a main project it was taken up in 1923. Prior to that it had been a side issue along with the stem-end rot simply to get our bearing to see how to start the work done principally at Orlando, Florida.

Yes, we had several people assisting us from time to time. We had temporary assistants—a Mr. Gallagher, a Mr. Link, and two or three other people, but they were simply routine assistants and they had nothing to do with the formulating of any of the experiments but simply to assist.

So far as I can recall, this article published in the Florida Grower, November 1, 1924, Plaintiff's Exhibit No. 45, was the first published description of our work.

Mr. H. R. Fulton, who collaborated with me in this article, is with the Bureau of Plant Industry, Pathologist. At times he would come down to Florida and spend two or three weeks each winter. His office most of the time was at Washington.

Q. 66. At the time this article was written, had you heard of the Brogdite and Brogdex process?

A. I do not think I had. Wait a minute. That question again, Brogdex? Yes, sir, I heard of the Brogdex back in 1919 or 1920, something like that, yes, about 1920.

Q. 67. Had you heard at that time that the so-called Brogdite process consisted in a borax treatment for the fruit?

A. No, sir.

Q. 68. When did you first hear of that?

A. To the best of my recollection it was during the winter of 1924-25.

[fol. 272] Q. 69. Under what circumstances did you hear about it?

A. One of the chemists from the Borax Company in New York came down to Florida and I tried to get him to give me some special assistance in solving some of our problems down there with the borax, and he refused, and I kept pumping him and he told me that his company was supplying the Brogden Company with borax and for that reason he did not want to divulge any information at all. He also said that a patent was about to be issued on this subject.

Q. 70. That is your first knowledge that the Brogdite consisted of borax?

A. Yes.

Q. 71. What other workers were stationed in Florida or Orlando?

A. For the whole department or for the——

Q. 72. Well, the department you were connected with?

A. That I was connected——

Q. 73. During the period of this stem-end work?

A. Well, there was Bowman, A. J. Bowman, and W. J. Batche. A fellow by the name of Perry. His name is not listed there.

Q. 74. Was Mr. Barger in Florida at that time?

A. I though you meant—I was speaking strictly of our office. Mr. Barger was there.

Q. 75. What bureau was he connected with, or what division?

A. The same bureau, Bureau of Plant Industry, but a different office.

Q. 76. Just what was his office, what was his work?

A. The office of Horticultural and Pomological Investigations.

Q. 77. How long was Mr. Barger there, do you recall?

[fol. 273] A. I should imagine about two years.

Q. 78. Do you know what years those were?

A. He came to Florida in the fall of 1921 and I think he left in the fall of 1923.

Q. 79. I note this circular bears date October, 1923; this circular No. 293, relating to control of stem-end rot, and I understood you to say that your work was concluded in 1922. Is that an unusual length of time to elapse between the conclusion of an investigation and the publication of the bulletin in the Department?

A. That is rather speedy.

Q. 80. What is the reason that the Department is so long in announcing results of any investigation of this kind?

A. They want to be certain that the results are dependable; that no mistakes have been made.

Q. 81. Do you recall about what time of the year you commenced working on this blue mold decay as the principal object of the investigation?

A. I would imagine—I do not know, but I imagine it was in the fall.

Q. 82. The fall of 1923?

A. I would imagine it, yes.

Q. 83. Do you recall whether it was before or after you went to Washington that summer?

A. Doubtless after.

Q. 84. Just briefly what was the nature of the work that you did in the fall of 1923 until the fall of 1924, when this article in the Florida Grower was published?

A. Well, we—of course we had some stem-end rot and they are still conducting stem-end rot experiments, but we were conducting, as I recall it, some tests with borax for blue mold decay.

Q. 85. When was this?

A. During the fall of 1923 and the spring of 1924.

[fol. 274] Q. 86. Were you not working—I thought I understood you to say that you were working primarily on blue mold rot during the period from the fall of 1923 to the fall of 1924, was that correct?

A. If I said it, I did not intend it. I said we just eased over gradually from stem-end rot to blue mold. It was gradual rather than sudden.

Q. 87. Do you know whether or not Mr. Fulton did any work along this line in Washington?

A. I am quite certain that he did, but I really do not know.

Q. 88. Were you in Washington at any time between the fall of 1923 and the spring of 1924?

A. Yes, sir, one day.

Q. 89. Were any shipping tests conducted during that period?

A. Yes, sir.

Q. 90. What sort of tests were the shipping tests?

A. We conducted some—we put a few boxes in each of several cars going from Bragden and Florence Villa to Seattle, Spokane and Portland, I think; but anyway to the far Northwest, and I am quite certain we made some express shipments of the same sort of treated fruit from Florida to Washington.

Q. 91. How was that fruit treated, do you recall?

A. We conducted quite a number of tests. In some we simply dipped the fruit instantaneously, almost, in borax, cold or cool borax rather, borax solution. The borax solution was held around 70-75, and in some others we submerged the fruit in warm borax bath and kept it there several minutes.

Q. 92. Did you observe any difference in the effect of the dip in the cold solution and the soaking in the hot solution?

A. Yes, sir.

Q. 93. What difference did you observe?

[fol. 275] A. The soaking in the hot solution gave the better results. We conducted a number of experiments along that line. In some we soaked them in hot borax solution for the entire period; in others, we soaked them in hot water, plain water, for the same length of time, then dipped them in cold borax. There was no appreciable difference in control between the hot water soaking, following by instant borax dip and the prolonged hot borax dip, but the heat treatment was better than the cold. We could see no appreciable difference between the dip, instantaneous dip, and soaking the fruit four of five minutes or thereabouts in cold borax solution. In other words, the heat seems to be the factor there rather than the heat and borax at the same time.

The heat probably kills the mycellium or the vegetative part of the blue mold fungus. The borax kills the mycellium but does not kill the spores. It inhibits the development of the spores, it inhibits the germination of the spores. Our experiments involved the use of different concentrations of borax.

As I recall it around 4 per cent., perhaps a little more, gave good results and as you decreased the concentration down to practically nil the results decreased considerably but not proportionately. You got pretty good results as I recall it at concentrations of 2½ per cent. or more and then it began to fall off rapidly. We got some inhibiting action at lower per cents.

Q. 101. Did you keep notes of your stem-end rot work and blue mold rot work?

A. Yes, sir.

Q. 102. What did you do with your notes when you left the Department?

A. They were left with the Department in the files.

Q. 103. Have you made any search to locate them?

[fol. 276] A. Yes, sir.

Q. 104. Whereabouts did you search?

A. In the files at Orlando and in Washington.

Q. 105. Were you able to locate your notes?

A. Which notes?

Q. 106. The blue mold notes?

A. Not the early notes.

Q. 107. The ones that you made during the investigation of the stem-end rot when you were using different germicides to kill the blue mold on the oranges?

A. No, I could not find those at all.

Q. 108. How long a time did you search for these notes in Washington?

A. About ten days.

Q. 109. That was immediately before the trial here?

A. Just before the trial.

Q. 110. At what temperatures did you find borax effective, that is, when you refer to a cold solution, what temperature did you have in mind as a cold solution?

A. Around room temperature, 70 or thereabouts, 75.

Q. 111. How does the temperature of the water affect the amount of borax or boracic acid you can get in solution?

A. I am not dead certain, but I think at a temperature of 70, 5 per cent. is saturated solution or approximately so. As you lower the temperature the amount of borax that will go in solution decreases rapidly.

By the Court:

Q. 112. Crystallizes out on lowering the temperature of the water?

A. Yes, sir.

[fol. 277] By Mr. Morton:

Q. 113. And above 70?

A. You can put more in.

Mr. Morton: That is all.

The Court: May I inquire just a moment from Mr. Morton? Will you give me the dates as to the beginning of the use of borax by him and the completion of it? I am afraid I missed some of it.

Mr. Morton: He stated that he used his borax supplemental to his stem-end rot or in connection with the stem-end rot in 1921 as checking the growth of blue mold so that he could observe the action of the stem-end rot. The blue mold work, he said, was taken up in the fall of 1923 as the prime object of his investigation.

The Court: Then I have it, yes.

Cross-examination.

By Mr. Neave:

X Q. 114. Mr. Winston, in your paper in the Department of Agriculture circular No. 293 of October, 1923, which is Plaintiff's Exhibit No. 41, there is a footnote which states that blue and green mold and blister rot forms a common cause of decay and that it requires different procedures for control from the stem-end rots. That was your knowledge at that time, was it?

A. Why, yes and no. We had by 1923 collected a fair amount of data of a preliminary nature showing that blue mold could be checked readily by borax, but it was not ripe for general distribution.

X Q. 115. Now, you missed my question. Your statement was that the blue mold requires different procedures for control from the stem-end rots?

[fol. 278] A. Yes, sir.

X Q. 116. And that was your knowledge at that time?

A. Yes, sir, in general.

X Q. 117. Then in an effort to find an effective non-injurious and cheap disinfectant for the prevention of blue mold rot on citrus fruits, the offices of fruit disease investigations of the United States Bureau of Plant Industry conducted extensive tests which included some fifty or more chemicals. Is that right?

A. I did not have anything to do with that. That work was conducted in Washington——

X Q. 118. By whom?

A. By Fulton and Bowman.

X Q. 119. My question is a quotation from your paper of November 1, 1924.

A. Was not that by Fulton; did not Fulton write that?

X Q. 121. It may have been, because it says it is by Fulton and you.

A. That is what I understood. The work was done by Fulton.

X Q. 122. You did not have anything to do with that?

A. No, sir.

X Q. 123. That first sentence I indicated?

A. That work was done in Washington. That is the testing of the chemicals, a large number of chemicals, was done in Washington.

X Q. 124. I also find in this paper, apparently written by you and Fulton, November 1, 1924:

"That a surprising and gratifying development"—of this borax treatment—"was the reduction at the same time of stem-end rot from 35 to 18 per cent."

Does that state the fact?

[fol. 279] A. I think so.

X Q. 125. And this paper of yours and Fulton's published November, 1924, was to get before the fruit industry what you then believed to be the good effects from the use of borax, so that the industry might benefit from it,

and so that they might advise with you, if they so desired, as to how to use this borax treatment most effectively?

A. Yes.

X Q. 126. And borax treatment was finally developed as you stated in November, 1924, and it was found that the borax treatment, in addition to preventing blue mold decay, was very effective against both types of stem-end rot that you have spoken of; that is true, is it?

A. Yes, sir.

X Q. 127. Now, before November 1, 1924, what had you known of the Brogdite process? You said you did not know that the material used was borax.

A. Please get the dates straight. November 1, 1924—I do not think I ever heard of it, I am quite certain I did not.

X Q. 128. Never heard of the Brogdite?

A. That is the Brogdite.

X Q. 129. Yes, this is the borax process.

A. No, sir, never heard of any borax process, not so far as I recall.

X Q. 130. Did you testify something about dipping the fruit in a hot borax solution, and thereafter in cold water, or was it just hot water?

A. Hot water and dipped in cold borax solution.

X Q. 131. How hot was that water?

A. 100 to 110, or something like that, 120 perhaps. I do not remember the exact figures. I have not found the notes.

[fol. 280] HERBERT C. GORE

HERBERT C. GORE, was called as a witness on behalf of the defendant, having been duly sworn, testified as follows:

Direct examination.

By Mr. Morton:

I reside in New York City. I am a chemist with Fleischmann & Company.

I entered the employment of the Department of Agriculture, I believe in 1903 and was there nineteen years. I was employed in the Bureau of Chemistry. Dr. Wiley and Dr. Alsberg were the chiefs of the bureau at the time I was there. Dr. Wiley was there when I first went there.

I recall Dr. Wiley's investigations of food adulteration which preceded the passage of the Pure Food Act.

I was on the so called Poison Squad and Hygienic Table, which underwent tests with various chemical preservatives. The only test I was on was boric acid. The boric acid had a toxic effect. It made me very uncomfortable. I got over it all right, but it certainly made me ill.

I recall an experiment I conducted with citrus fruit in the early days of my employment by the Bureau of Chemistry. I made notes of that experiment.

Mr. Neave: What is this, prior knowledge or use or something?

Mr. Morton: These are some notes relating to the use of borax on citrus fruit. We are not offering this as an anticipation because this was an experiment which was conducted. There has been a great deal of testimony taken here to show that the Department of Agriculture was ignorant of the effect of borax. I want to show knowl- [fol. 281] edge, knowledge of the Department, and the workers which were in the Department, on that subject.

Mr. Neave: The point of my inquiry was that nothing of this sort was pleaded in the answer.

Mr. Morton: Oh, nothing was pleaded of that sort. This is an experiment. We are not offering this——

Mr. Neave: You are not trying to prove prior knowledge or prior use or prior public use?

Mr. Morton: It is not a——

The Court: Not a statutory bar?

Mr. Morton: Not a statutory bar or anything of that sort. It goes to the question of invention, as to whether there was invention in this use of borax.

This is a certified copy from the files of the Department, a copy of my notes. That experiment was conducted, I believe, in 1904. I recall the circumstances that led up to the experiment, but not so very clearly, I must confess.

As nearly as I recall the work was initiated by Dr. Powell, at that time a pomologist in charge of fruit transportation investigations, who was interested in a certain patented process in which, this is a little bit vague—in which blotting paper was saturated with potassium nitrate and allowed to smolder and the fumes allowed to pass into the freight car. That is the very inception of the work and in investigating that it occurred to us—that was supposed to have an effect on the citrus fruit in protecting it from any deleterious action in transit and in thinking over that subject and working in co-operation with others, we conceived the idea of trying other chemicals definitely to see if they would have the same effect and we tried [fol. 282] boric acid primarily, I imagine particularly because of my association with it about a year ago, a year before that time.

These notes correctly describe the procedure that I followed and the results that I obtained.

We got the inhibition or stopping of the germination of the spores of blue mold which were of course rubbed on the abraded surfaces and then the oranges dipped in boric acid solution and allowed to dry, and we observed that in those fruits that had been so treated the mold was very slow in starting, it did not start for a good many days, whereas, in the control it went right off. Dr. W. N. Scott assisted me with this experiment. He was connected with the Bureau of Plant Industry.

I reported the results of this experiment to Dr. Powell, and I believe also to Dr. W. A. Taylor. I remember that Dr. Powell noticed the presence of a few crystals of boric acid on the surface of the oranges, and just at that time I might say there was a great deal of agitation against the use of any chemicals in connection with foodstuffs on account of the agitation in connection with the Pure Food Law which passed a couple of years later, and Dr. Powell did not like the idea of anything suggesting that chemicals had been used appearing on a wrapper or on an orange and he rather deprecated the idea of using boric acid for that reason. I did not at any time after that do any work of this sort.

The particular nature of my work in the Bureau of Chemistry was to deal with other problems involving fruit and later other vegetables as the years went on. It was research work entirely.

Mr. Morton: I offer in evidence the copy of the notes just referred to.

(Received in evidence and marked "Defendant's Exhibit No. 9.")

[fol. 283] Cross-examination.

By Mr. Neave:

X Q. 33. I see in your notes here in different places a reference to boric acid What is boric acid?

A. Boric acid, the formula is H_3BO_3.

X Q. 34. Is it the same as boracic acid?

A. Yes, sir.

X Q. 35. And how does borax differ from boric acid?

A. That is the sodium salt of boric acid, the common sodium salt.

X Q. 36. And that is alkaline in water?

A. When dissolved in water the water becomes alkaline.

X Q. 37. And the boric acid is, I suppose, acid?

A. Very slightly, yes, sir.

X Q. 38. What are these pages that have been put in evidence, these photographs, are they some notebooks of yours?

A. I imagine they are from my report.

X Q. 39. Don't you know?

A. I do not know definitely.

X Q. 40. The first two pages that have been put in evidence are numebered 1 and 2 in ink. When were those ink numbers put on?

A. They were put on by myself at the time, and I see that the two other pages are these two pages simply copied, if you will notice. This is a copy of these notes, here if I am not mistaken.

X Q. 41. And so after pages 1 and 2 we come to pages 9 and 10. What was there in between?

A. I don't know, sir.

X Q. 42. Have you got your whole thing here?

A. No, sir, I am sorry.

X Q. 43. And then apparently the pages skip from 10 to 16 and go from pages 16 to 19. You do not know what was between pages 10 and 16?

[fol. 284] A. No, sir.

X Q. 44. Was the information that is contained in these reports of yours, or whatever they are, ever made public?

A. No, sir.

X Q. 45. In glancing this over, I do not see that you used any borax, did you?

A. No, sir.

X Q. 46. What is the Baker process?

A. I do not exactly recall. The process I mentioned a few minutes ago, the name that sticks in my mind is the Cooper process, but I may be mistaken at that.

X Q. 47. Your notes here on page 16 refer to the Baker process: "First treated by Baker process."

A. I cannot quite recall what the Baker process was unless it is this process which it seems to me goes by the name of Cooper.

X Q. 48. On page 1 of this material that has been put in evidence there is a statement that "In the photograph accompanying this report," and so forth. Have you a copy of that photograph?

A. No, sir.

Mr. Neave: I beg your pardon; I have not finished reading. May I look through?

The Court: Yes.

X Q. 49. Have you got a copy of these pages there?

A. Yes, sir.

X Q. 50. Look at page 16. I do not see that the year is stated there?

A. Well, it evidently is in 1905. You will find it there on the ninth line, 1905. You see January 3d, 1905?

[fol. 285] X Q. 51. Oh, yes. Then the 1905 carries through. Now, Mr. Powell was familiar with this work?

A. Oh, yes, kept in close touch with it.

X Q. 52. Did you ever do any work after January, 1905, on this matter?

A. No.

X Q. 53. And you remained in the Department how long?

A. Well, until about three years ago when I left the Department.

X Q. 54. Did you have anything to do with the preparation of the Agricultural Department Bulletin No. 123, entitled "The Decay of Oranges While in Transit From California," by G. Harold Powell?

A. No, sir.

X Q. 55. I see he was assisted by a number of others. Your name was not mentioned. You had nothing to do with that?

A. No, I was not in on that work.

X Q. 56. The G. Harold Powell is the Powell to whom you are referring?

A. Yes, sir.

X Q. 57. Were you familiar with this bulletin?

A. I read it when it came out, I remember.

X Q. 58. And Mr. Powell here appears to state:

"It has often been suggested that the blue mold might be killed by a disinfectant in the wash water, as is done with the parasitic fungus of the lemon which produces brown rot. This does not appear from preliminary studies to be promising or advisable."

Were those preliminary studies the ones you have been testifying about here?

A. Well, I imagine they were some of them, yes, sir. I do not know myself of any others.

Mr. Neave: That is all.

[fol. 286] Redirect examination.

By Mr. Morton:

R. D. Q. 59. In whose handwriting is this free-hand-writing on page 1 of this report?

A. That is my own report; I recognize that plainly.

R. D. Q. 60. Do you know when that writing was made?

A. Well, at the time the work was done, unquestionably, before the stenographer had it for the final draft.

Recross-examination.

By Mr. Neave:

R. X Q. 61. Did you get these papers together for Mr. Morton?

A. No, sir.

Mr. Neave: That is all.

(Witness excused.)

William M. Scott

William M. Scott was called as a witness for the defendant and, having been first duly sworn, testified as follows:

Direct examination.

By Mr. Morton:

I am employed with the American Fruit Growers at Sanford, Florida, as division manager. I was in the Department of Agriculture from 1903 until 1913 and then again from 1916 to 1919. I was connected with the Bureau of Plant Industry, Division of Fruit Disease Investigations.

The work of that division consists in conducting investigations of fruit diseases, studying the life history of [fol. 287] the fungus—of the organisms that cause these diseases and the conducting of experiments with fungicides for the control of such diseases,

The only fungicides that I could definitely lay claim to having developed myself was that of self-boiled lime sulphur for the control of brown rot of peaches, which, when spread upon the trees, prevents, to a large extent, the development of that trouble. Another piece of work was that of developing treatment for the bitter rot of apples, which treatment proved to be successful.

I heard Dr. Gore testify. I am the W. M. Scott whose name appears on these notes that were introduced in Dr. Gore's testimony. Dr. Gore and I conducted the experiments referred to in these notes jointly. I personally provided the artificial media and pure cultures of the penicillium spores for the work and he and I jointly inoculated the specimens, dipped them and made our observations from time to time as to the results.

I do not recall all of the circumstances that led up to this experiment. The only thing I recall is that at that time

citrus fruit was not carrying to the market in satisfactory condition due to so-called blue mold rot, and Mr. Powell had just started his investigations; and, as I recall, had asked Dr. Gore to make certain tests which Dr. Gore has already mentioned, and we became interested in the problem in that manner.

The test that I referred to is the fumigating car. I do not recall referring the results of our experiments to anyone.

I am an officer of the American Fruit Growers, a director. I have been a director of the American Fruit Growers since 1919, since the incorporation of the company.

I can explain how the work is divided into different divi- [fol. 288] sions of the Bureau of Plant Industry. In order to avoid the duplication of work, the lines between the two divisions were drawn rather sharp. The Division of Fruit Disease Investigations, for example, was not permitted to encroach upon the field of operation belonging to the division of other food investigations, and so on throughout the Bureau and the Department.

Those lines of demarcation between the work of one division were determined, in the first place, largely by appropriations made by Congress. Congress, as a rule, made the appropriations for specific purposes, a certain sum for fruit disease investigations, and a certain sum for pomological investigations, handling cold storage and so forth, and then there was a committee at times, not a continuous committee, but at times a committee was appointed to define the work of each division, so that there would be no overlapping or duplication. I was a member of that committee at one time for a period, probably, of one year.

I recall Dr. Powell's careful-handling crusade very vividly. The results of that crusade had been published in bulletin form and I could not say definitely the percentage of the reduction; but as I recall, from my own memory, the work was very satisfactory, and we were particularly interested in the prevention of diseases in fruits, were enthusiastic over the results at that time, so much so that we did not pursue our investigations for a chemical to prevent the trouble. I might say further, in answer to that question, that I was on a trip to California in connection with other work. Professor Powell took me there through the packing house in which he was conducting his experiments and

succeeded in getting me thoroughly enthused over his work and the results which he was obtaining.

[fol. 289] Cross-examination.

By Mr. Neave:

Between 1913 when I left the Department of Agriculture and 1916 when I came back to it I was employed in the Research Department of the General Chemical Company stationed at Baltimore at their Thompson Chemical Company branch. I was engaged in research on insecticides and fungicides for the control of plant diseases.

For the first two years after I left the Department in 1919 I was jointly in charge with others of production operations in the Appalachian District, of apples and peaches, with the American Fruit Growers. I have been with the American Fruit Growers ever since 1919.

In 1921 I was transferred to Sanford, Florida, and made division manager of the vegetable division of the American Fruit Growers. I am still there. The vegetables include celery, tomatoes, lettuce, peppers and so forth.

When with the General Chemical Company I worked on insecticides and fungicides, arsenate of lead, calcium arsenate, lime-sulphur solution, a patented material known as atomic sulphur and various spray materials.

Practically all of the insecticides were poisonous, arsenate of zinc, arsenate of lead, and arsenate of lime are all deadly poison. They are used for insect control. They are sprayed on the trees—sprayed on apple trees, sprayed on potato vines, for the control of beetles, sprayed on peaches; that is arsenate of lead is sprayed on peach trees. Arsenate of lead is sprayed on apples and gets on the fruit itself.

The application of the spray is during the growing period and the principal application for the control of the codling moth, which is the principal insect sprayed for with arsenate of lead, is made shortly after the blooming period, soon [fol. 290] after the petals have dropped. The apple is standing up at that time with the calix end open and the object is to deposit some poison into that cavity so that when the worm tries to enter it gets this poison before entering the fruit. Then other applications are made later, but most of the poison is dissipated by rains and dews and the

picking and handling of the fruit through the packing house, so that when it reaches the consumer it is supposed not to contain a poisonous dose, but it does of course contain some of the poisons.

Arsenic, of course, is a much more deadly poison than borax. I could not say if meats are sold nowadays with the borax on, or fish. It is so far out of my line. I do not know what tolerance is permissible in the amount of arsenic on apples supplied to the market.

Redirect examination.

By Mr. Morton:

The Bureau of Chemistry enforcing the Pure Food Act while I was in the Department of Agriculture paid no attention to the spraying and had no regulation over the spraying of trees with poisons for the control of insects. They devoted that attention to the finished product that was offered to the consumer for consumption; in other words, preservatives that had been used in canned goods, preserves, and fruits and so forth, they were referred to as preservatives. And borax would come in that class. It could also be called a fungicide because of its action on fungi.

Recross-examination.

By Mr. Neave:

The American Fruit Exchange sells apples.

When I went to the American Fruit Growers in 1919, I did not then or thereafter speak to them about these [fol. 291] experiments that Dr. Gore has been testifying about and I did not recommend that they should use borax.

Mr. Morton: Now, Mr. Barger.

WILLIAM R. BARGER

WILLIAM R. BARGER was called as a witness on behalf of the defendant and, having been duly sworn, testified as follows:

Direct examination.

By Mr. Morton:

I reside at Pasadena, California. I am employed by the Department of Agriculture, United States Government. I have a permanent station at Pasadena. I have been employed by the Department of Agriculture since June, 1921.

When I first entered the Department I was on field work in Southern Michigan. That lasted until September, 1921. I was then called in to Washington, and in a very short time went to Florida. I started in at Florida late in September, 1921, or the first of October.

I was back and forth between Florida and Washington until June, 1923, when I went to California. I would be in Florida during the early shipments and in the spring during the later shipments. I would be in Washington during the winter and during the summer.

I am the William R. Barger whose name appears on this article from the California Citrograph, Plaintiff's Exhibit No. 48. That article deales with certain work of treating oranges with borax solution.

Most of that work was done at Azusa. This was a reprint of a discussion given to the oral presentation of the paper some time before, and the work was done at Azusa, California, in October and November, 1924.

[fol. 292] I do not recall the date of the talk. It was some time previous to that. The time was ripe for the work. The work was done in November, September and October—last of September, October and November of 1924. Then I presented it orally, and later it was published. It was published several months later.

The general idea of using borax for the control of blue and green mold came during the time I was in Florida. I made Orlando my headquarters; would go out from that city primarily because the Department of Agriculture had a laboratory at Orlando and I would be in and out of that laboratory during my stay in Florida. I learned about the use of borax at Orlando for the control of blue mold through my association with the men down there—Mr. Winston, I heard in a general way the experiments he had carried on.

I was on entirely different work. I was impressed by hearing the discussions that go around the laboratory and I remember the use of borax.

Q. 18. What led you to take up the work in California?

Mr. Neave: What work, Mr. Morton?

Mr. Morton: The work described in his article of March, 1925, Plaintiff's Exhibit No. 48.

A. Well, the people that knew of the laboratory there were interested in our work, which is handling, transportation and storage of fruit, specializing on citrus fruit, and I think the packing house men heard mold, pen-cillium mold was stopped by experiments, I guess, that were carried on in the State and they asked me questions. Whether they wanted confirmation by the Department or just what, I do not know, but I worked to satisfy my own curiosity. I put on the things that came on the treated fruit, the things that came in my mind and reported the findings to the project leader [fol. 293] in Washington, and among the things I used was borax or boracic acid. That was the first solution. The other solutions were of zinc chloride and of alum. While I had no authority from the office to continue, I did in a small way, to convince myself of the retarding of this penicillium mold by the treatment, but I had no authority to go ahead until some time later to really put time in on that work.

Q. 19. Were the three chemicals which you mentioned some of the chemicals that you had heard about when you were in Florida?

A. Yes, sir.

Q. 20. When, as near as you can recall, did you first learn of these chemicals, particularly boric acid by Mr. Winston and others in Florida?

A. They discussed it more during the spring; that is, I imagine March. That is, around that time in 1922, on my second trip to Florida.

My immediate superior in the department is Mr. Hawkins. I am still carrying on experiments in California for the control of blue and green mold, for the control of decays occurring in transit, citrus decays, which includes mold.

The Department is still advocating careful handling of the fruit as the prime requisite to preserving the fruit to market. The bulletins advocating careful handling, as you can see by the record, are quite old. A recent one was issued, I believe, last fall, I think, and the senior authority was Shamel, and that was on the handling of citrus fruits, not the handling but the growing of the citrus fruits in the Pacific Southwest, and that is a revision of former bulletins that have been in existence or have not been revised inside of ten years, roughly speaking. In his publication he gives a small section there to careful handling, and that is to the handling of the citrus fruit, and he refers to careful handling being of primary importance.

[fol. 294] I do not know the number of that bulletin. I have no copy of it here in Wilmington.

I have done a good deal of experimental work with borax in treating oranges in trying to find a suitable method of employing borax. I have tried different periods of duration in which the orange is in the boric solution. On the laboratory tests we keep records of time the fruit is in the solution. The time is not of any great importance. A wetting of the injury is sufficient to give marked control of the penicillium mold.

A thorough wetting is all that is required. The records show and the former work shows that wetting is sufficient. My own personal records, and the records that I have kept, I have tried to form a minimum length of time in an ordinary soaking tank. That is, the soaking tanks that are in the packing houses are more or less uniform, about the same size, and I think the minute has been our shortest time we have allowed fruit to be in the solution, that is, the fruit that we have kept records of.

In order to insure that all the fruit is inoculated and subject to decay a rather large slice of skin is taken from the rind near the stem end by ordinary clippers that have been sharpened so that they do a clean job of it—clippers are supposed to be made that they wouldn't make these cuts, but we have to sharpen them over again to make the cuts even—that type of injury exposes a white tissue underneath the oil cells. It is then inoculated with the spores, our laboratory experiments show that the short dip will retard the mold.

Q. 32. Have you observed the effect of washing off the solution by passage of the orange through a commercial washer in any of your work?

A. Yes, some houses put the borax right into their soaking tank and used, well it has been described. After the brushes were softened they felt that the solution carried up [fol. 295] on the oranges was sufficient to keep the brushes soft so that they would not injure the fruit and they have run very many cars, in fact, it is the general practice in some houses to use that treatment and it is very effective and satisfactory.

Q. 33. Have you noted any difference in commercial results in instances where the fruit was run through an ordinary washer having a solution and in cases where it was not?

A. No. I am interested in the work, of course. My impression on looking over the data as available, either by discussing with people who have shipped the different treatments, and ideas that I have gotten from my own work, I cannot see that any great advantage to increase the time as far as the control of decay is concerned.

Q. 34. When did you first hear of the plaintiff's so-called Brogdex-Brogdite treatment?

A. Brogdex, I heard of that when I was in Florida, the wax proposition. I heard about the Brogdite by name, well, I know it was before our assignments were started, by name, Brogdite. I did not know the material that was used until the patent came out.

Q. 35. That was after you went to California you heard of the Brogdite?

A. The Brogdite, yes.

Q. 36. When did you first learn that the so called Brogdite treatment consisted primarily of the use of borax?

A. At the time the patent was issued.

Q. 37. That was your first knowledge of that fact, was it?

A. Yes.

Cross examination.

By Mr. Neave:

X Q. 38. Where do you now reside, Mr. Barger?

A. Sir?

[fol. 296] XQ. 39. Where do you now reside?

A. Pasadena, California.

XQ. 40. Are you still connected with the Department of Agriculture?

A. I am.

XQ. 41. And did you come East just for the purpose of testifying in this case?

A. Yes.

XQ. 42. How did you happen to get away?

A. I have authority.

XQ. 43. Did you leave with the permission of the Department?

A. I have authority.

XQ. 44. Did you have authority to leave when you went, and did you leave with the permission of the Department?

A. They know I am here, yes.

XQ. 45. You advised them before you came?

A. Yes.

XQ. 46. You were not subpœnaed, of course?

A. No, I have never been subpœnaed. I do not know.

XQ. 47. Who asked you to come here, Mr. Barger?

A. I got a wire from Morton. Mr. Morton.

XQ. 48. And he talked the matter over with you before you received that wire from him?

A. I never met Mr. Morton.

XQ. 49. When did you first go to Florida?

A. June, 1921. September, last of September or first of October.

XQ. 50. And when did you first go to California?

A. June, 1923.

XQ. 51. Have you ever been to the College Heights Packing House, California?

A. Not that I know of.

XQ. 52. Have you ever been to the packing house at Strathmore in Tulare County, California?

[fol. 297] A. I imagine I know what you mean. I went to the experiments they had up there. I visited Mr. Brogden, yes.

XQ. 53. That was in November, 1923, was it not?

A. November or December, yes.

XQ. 54. And you met Mr. Brogden there?

A. Yes.

X Q. 55. And you were friendly with him, used to lunch together, didn't you?

A. He was friendly with me. We went to lunch together. He took me in his car.

X Q. 55a. He cashed a check for you, did he not?

A. Yes—thank you.

X Q. 56. Now, what did you see there at Strathmore, in the packing house; what was going on there in November and December, 1923?

A. They were treating fruit to preserve it.

X Q. 57. Who? Mr. Brogden treating fruit?

A. Mr. Brogden and at the direction of the other experimenters with him.

X Q. 58. And how was the fruit being treated there at that time?

A. I was there. I believe I assisted with clipper-cutting and inoculating the fruit. I was there on a trip through Tulare County, and I know we had a young man there with him who was heating up the water in a tank. I think they put material in the tank.

X Q. 59. You saw them do that, did you not?

A. Yes.

X Q. 60. What was this tank, a soaking tank?

A. It was just a galvanized iron tank. I imagine it came from some other packing house. Just an ordinary packing house open tank.

X Q. 61. And then they would put some kind of stuff into that water in that tank, would they?

A. Yes.

X Q. 62. Then what would they do?

[fol. 298] A. They clipped fruit in when the water was hot.

X Q. 63. Then what would they do after they got the solution in?

A. They put the fruit in, treated the fruit.

X Q. 64. They then treated the fruit. How long did they let it stay in that tank?

A. I don't remember. I think they took it right out, I wasn't particularly interested.

X Q. 65. Then what would they do with the fruit after it had gone into the tank for a time?

A. They put it on racks, I believe.

X Q. 66. Did it go through a washer?

A. No.

X Q. 67. The fruit was just taken out and put on racks?

A. Yes.

X Q. 68. Then what happened to it?

A. We went to lunch, after lunch it was packed—it was dried—wrapped and packed?

X Q. 69. How many days were you there in that packing house?

A. I don't remember that these tests—I was there in the morning and the afternoon of that day.

X Q. 70. Now, about this matter that they were using to put in the water in the tank. What did it look like?

A. I do not know.

X Q. 71. You saw it, did you not?

A. I said I was there while they were putting it in. I paid no attention to it.

X Q. 72. What were you there for?

A. Part of my work is to be familiar with citrus territory. I met Mr. Brogden's collaborator in Lindsay, at the United States Department, Bureau of Entomologist's laboratory there, and it was at their invitation that I got to the packing house, or their experimental house.

[fol. 299] X Q. 73. What was the name of this collaborator of Mr. Brogden's that you spoke of?

A. Mr. Nelson.

X Q. 74. And he invited you to come up there to the Strathmore house on that occasion?

A. Yes, Mr. Brogden invited me to return.

X Q. 75. To return?

A. In the afternoon.

X Q. 76. Oh. Where were you given this invitation by Mr. Nelson; where were you at, Tulare or some place else?

A. Well, it was there at Lindsay. I believe it was.

X Q. 77. I beg your pardon.

A. Lindsay, I think, was the town.

X Q. 78. Some distance away from Strathmore?

A. Well, Strathmore is between Portersville and Lindsay. I was staying in Portersville.

X Q. 79. And when Mr. Nelson gave you that invitation, that was the first you knew of any experiments being conducted there at Strathmore?

A. In connection with fruit.

X Q. 80. What did he tell you?

A. He said—well, I don't remember what he said. He said he was there with Mr. Brogden, and I think it was a day or so later—I think that it was. It was not that day, I am sure.

X Q. 81. Well, even——

A. Some time later they met me and invited me out—in the morning out to their experimental plant.

X Q. 82. They invited you out there to see what?

A. To see some oranges packed; to see them work.

X Q. 83. To see what?

A. To see them work.

X Q. 84. What did they tell you were going to see? What did they invite you to see?

A. They said they had the new process that was being just discussed over the State.

[fol. 300] X Q. 85. So you went out there to Strathmore that morning to see that new process, did you not?

A. Well, I was interested, of course.

X Q. 86. So you were interested?

A. Interested in anything pertaining to citrus fruit.

X Q. 87. So you went there and saw what the process was, did you not?

A. I saw them working at their experiments.

X Q. 88. Did you see that they put anything into water?

A. I knew they were putting something in the water.

X Q. 89. Yes.

A. I did not see them put it in particularly; I was not interested in that.

X Q. 90. Why not interested? You went there to see a new process?

A. It is—what do they call it, a proprietary affair that we have no interest in primarily; wanted to see the outcome of the thing.

X Q. 91. Did you see any chemicals around there?

A. Nothing particularly.

X Q. 92. Did you see any white powder around there?

A. There may have ben some white power. It looks like flour or anything else, doesn't it?

X Q. 93. Did it look like borax?

A. I did not know much about borax at that time.

X Q. 94. Did you not see them mixing up different

strengths of solutions so as to treat them with different strengths?

A. They were mixing up different strengths, naturally.

X Q. 95. How did they make those different strengths?

A. I do not know. I suppose they weighed it.

[fol. 301] X Q. 96. Weighed what?

A. Weighed the material. It would be the natural way to do it.

X Q. 97. You saw them weighing the material?

A. No, not particularly.

X Q. 98. Where were you when they were weighing the material?

A. I know they were back and forth from a sort of an anteroom to the tank. I did not pay any particular attention to that at all.

X Q. 99. And you took some of that material, did you not?

A. No, sir. I went back with Mr. Brogden.

X Q. 100. I beg your pardon.

A. I say, I went back to the hotel with Mr. Brogden. I think he knows I had no material. I know I did not have.

X Q. 101. Before you went to the hotel with Mr. Brogden, did you not ask Mr. Brogden or Mr. Nelson what that material was?

A. No. That was——

X Q. 102. When you got back to the—what is it?

A. That was in conversation; if I did, why, I knew I did not get any information.

X Q. 103. When you went with Mr. Brogden to the hotel did you ask him?

A. No.

X Q. 104. Then you went back to the packing house at Strathmore in the afternoon, did you not?

A. Yes, that afternon had lunch at Portersville.

X Q. 105. Now, why did you go back?

A. The fact that I think Mr. Brogden stood aside and thought I was a good worker.

X Q. 106. Did you do some work back there in the afternoon?

A. With the fruit, the packing of the fruit—wrapping and packing it in the boxes.

[fol. 302] X Q. 107. Did you again in the afternoon see this powder that looked like flour?

A. No, they were all through then, I suppose.

X Q. 108. They were all through with that, were they?

A. I guess so. I do not remember that.

X Q. 109. Did you taste any of that material?

A. No.

X Q. 110. Did you taste any of the solution that was in the tank?

A. No. Mr. Brogden did, I believe.

X Q. 111. I beg your pardon?

A. I think Mr. Brogden did. I did not. I saw him going through the motion.

X Q. 112. Did you see any whitish stuff around on the tank and on the machinery?

A. Nothing that was out of the ordinary; nothing that you would not notice at any other tank; ~~quite~~ a little water around there.

X Q. 113. Did the fruit look any different from what fruit ordinarily does when it comes out of the washing tank?

A. Yes, I believe so. I think I remarked on the difference. I do not know just what it was now.

X Q. 114. What was the difference?

A. Most probably, thinking back from handling fruit now, that it was probably more sticky. I do not know of anything else.

X Q. 115. Was it different in color?

A. No.

X Q. 116. Was there any paraffin being used on the fruit there?

A. No, sir.

X Q. 117. What made the fruit sticky?

A. I do not know. The type of fruit probably that it was. [fol. 303] X Q. 118. So you made absolutely no effort to find out what this process was that you went to examine?

A. No.

X Q. 119. And then what did you do after you had been up there to Strathmore? Did you leave that same day?

A. No. I believe, I do not know. It depends upon whether it was the end of my trip up there or not. I am not sure whether it was or not.

X Q. 119a. Did you go back to the Strathmore Packing House another day?

A. No.

X Q. 130. Have you ever been to the Walnut Packing House?

A. Yes.

X Q. 131. Were you there in January, 1924?

A. It was during that season, I imagine about that time.

X Q. 132. And you were there when they were using Brogdite?

A. By invitation.

X Q. 133. Who invited you at that time?

A. I am not sure.

X Q. 134. What do you remember about that invitation?

A. The direct invitation came from Mr. Nelson, but just how he was conected with it, I do not know. There was no surprise indicated to see me there.

X Q. 135. So that you went to the Walnut Packing House and how long did you remain there that visit?

A. Just while I was inspecting some fruit to see the result.

X Q. 136. And you do not know what process they were using?

A. Well, it was practically the same, that they were using a process.

[fol. 304] X Q. 137. And that did not interest you at all?

A. No. I went to see the result.

X Q. 138. That is, your investigations are not very definite as to what you want to go and see?

A. We really could not recommend a patented material if it was patented or any secret material.

X Q. 139. Was it patented so far as you knew at that time?

A. There was nothing said about patenting it or what the material was.

X Q. 140. Were they putting something in their soaking tank?

A. I did not see.

X Q. 141. How did you know they were using any process there?

A. I was told by Mr. Nelson that it was the processed fruit that we were to inspect.

X Q. 142. And did you go through the packing house where they were processing this fruit?

A. Not particularly.

X Q. 143. Did you at all?

A. I go through the packing houses, every packing house I go into.

X Q. 144. And you saw some bags and boxes of stuff around there?

A. No.

X Q. 145. And you made no inquiry as to what process they were using?

A. No.

X Q. 146. And did not take away any of the material?

A. No, sir.

X Q. 147. Did you take away any of the fruit?

A. No.

X Q. 148. Did you take away any of the fruit that had been processed at Strathmore?

A. No, sir.

[fol. 305] Q X. 149. Then how can you tell then whether or not there was any good result on the fruit from either of these processes?

A. From the inspection. They told me the time after treating, that is, the age of the fruit at the time of inspection, and they pointed out the non treated lots and the treated lots and that would be the normal procedure, and got information that way as to the keeping qualities.

X Q. 150. Then at the Walnut Street House you were not interested in what was going through the process but what had come through some time before?

A. Inspection of fruit that had been treated before.

X Q. 151. Without any knowledge on your part as to when it was treated?

A. They told me when it was treated.

X Q. 152. And did they tell you how it was treated?

A. No.

X Q. 153. How long were you at the Walnut Packing House?

A. Well, I do not know, just a short time, not more than a few hours, and it did not consume the whole day.

X Q. 154. Is that the first time that you had ever been there?

A. Yes, sir.

X Q. 155. When did you next go?

A. I probably visited there twice on the same sort of an errand; I am not sure whether I went back there again one time—I know one time the party that I went to lunch together and I think that was impressed more than any other—and probably another time. I don't know.

XQ. 156. When did you first make any attempt to find out what this flour-like stuff was that they were using?

[fol. 306] A. I never made any attempt.

XQ. 157. At Strathmore, don't you remember hearing them say what it was?

A. No.

XQ. 158. When they were changing the strength of the solution?

A. No, absolutely not. There was great mystery concerning the affair between Mr. Brogden and his assistant up there. That amused me.

XQ. 159. But did not interest you?

A. No.

XQ. 160. Are you the W. R. Barger to whom patent Nos. 1,598,697 and 1,559,733, which are Plaintiff's Exhibits Nos. 59 and 55, issued?

A. Yes, that is one, 1,559,733, cleaning tank, the first one on that.

XQ. 161. And you are the patentee of the other one also?

A. And the second, yes.

XQ. 162. Of these two patents, the one that was first filed on February 21, 1925. Had you ever previous to that time, filed an application for a patent on the treatment of fruit by means of borax or boric acid?

A. No, the tank was in use a long time after we attempted to get a patent. The tank was in use.

XQ. 163. Had you ever taken any patents previously of any kind?

A. No.

XQ. 164. And are you the William R. Barger, who, with Mr. Hawkins appeared as the authors of the article entitled "Borax as a disinfectant for citrus fruits," which was Plaintiff's Exhibit No. 50 (handing paper)?

A. I imagine that is the article.

XQ. 165. Well, there is no doubt about it, is there?

A. Oh, yes.

[fol. 307] X Q. 166. That is, the co-author?

A. I am the co-author of that.

X Q. 167. And you are the William R. Barger who appears to have written the article "Treating Oranges With Borax for Control of Blue and Green Mold," published in the California Citrograph, Plaintiff's Exhibit No. 48?

A. Yes, that is the article.

X Q. 168. Have you ever previously ever written any articles on this subject previous to those two?

A. No. This report——

X Q. 169. Plaintiff's Exhibit No. 50?

A. This report—was the day when the work was started, that was done——

X Q. 170. You have never written any previous reports?

A. No, I never have had authority to write any previous reports.

X Q. 171. And you never previously wrote any articles on this subject-matter?

A. On borax, no. My experience with borax experimentally dated from 1924, you say—and the Exhibit 50, is that it?

X Q. 172. That is right.

A. The one from the Journal of Agriculture Research is the report on that first work.

X Q. 173. When did you join the Department of Agriculture?

A. In 1921.

X Q. 174. In what Department were you at that time?

A. The Department of Agriculture.

X Q. 175. In what Bureau or Division?

A. Plant industry.

X Q. 176. The same as now?

A. The same as now.

X Q. 177. And what has been your experience?

[fol. 308] A. Graduating from college the June previously.

X Q. 178. And did you specialize in any particular line of work in college?

A. Horticulture.

X Q. 179. When was it that you tried zinc chloride and various other chemicals?

A. At the same time—the zinc chloride or boric acid rather, and alum, those three chemicals were taken up.

X Q. 180. And when was it you tried them?

A. 1924, I guess. Let us see what is reported there.

X Q. 181. That was just the beginning of your work, was it?

A. The beginning of my work in control of mold.

X Q. 182. And what was it that suggested zinc chloride to you?

A. The work in Florida.

X Q. 183. Had you had work on zinc chloride in Florida?

A. The tomato clippers used zinc chloride in Florida.

X Q. 184. And how did you find the zinc chloride worked on oranges and citrus fruit?

A. I do not know how the—I think the report states that it was not as effective at least as it was, maybe it was not as effective at all.

X Q. 185. And how did the alum act?

A. I think the report states there that it was not as effective. This boric acid was marked in its control of the mold.

X Q. 186. In your test at that time, which of these substances did you first try?

A. They all started at the same time.

X Q. 187. Did you mix them together?

A. No.

[fol. 309] X Q. 188. This Mr. Nelson that you were speaking of, who was Mr. Brogden's helper at Strathmore, tried these experiments, and he also invited you to go down to Walnut house, is that it?

A. That determines him as a co-operator.

X Q. 189. Co-operator—I beg his pardon.

A. Yes, I think it was through him that the invitations came.

X Q. 190. Why do you call him a co-operator; that is, did you understand that he and Mr. Brogden were working very closely together?

A. Yes.

X Q. 191. And knew the whole process?

A. Well, I do not know. He never said anything about it.

X Q. 192. But he was closely associated with Brogden, as you saw him in that work?

A. A. I saw them that were working together.

X Q. 193. And how long do you know did Mr. Nelson continue to be associated with Mr. Brogden?

A. I do not know; I have no idea when it was.

X Q. 194. Well, he became an associate?

A. He is probably still working.

X Q. 195. He became associated with you, did he not?

A. No.

X Q. 196. What were you doing down at Azusa?

A. We were applying the borie solution to fruit experimentally and at the house.

X Q. 197. And when was that?

A. The last of September and October, and November, 1924.

X Q. 198. And who was the "we" who were doing that?

A. Well, Mr. Nelson—you say associates.

X Q. 199. Mr. Nelson what?

[fol. 310] A. Mr. Nelson was in that work. He was the observer from the California Fruit Growers Exchange.

X Q. 200. That is, Mr. Nelson and you were working on that matter together?

A. He was observing the work.

X Q. 201. And you were observing the work?

A. I was conducting the work.

X Q. 202. And did he know just what you were doing?

A. We made no secret of this.

X Q. 203. So that Mr. Nelson was associated with you at that time, was he not?

A. He was observing all the work.

X Q. 204. For Mr. Brogden?

A. No, he was working for the California Fruit Growers Exchange.

X Q. 205. He had left Mr. Brogden then, had he not?

A. He had never left him or been with him.

X Q. 206. But you and Mr. Nelson at Azusa there at that time, in September and October, 1924, were working intimately together on that work?

A. Well, there was nothing to it. We put borax in a tank and experimented with fruit and made inspections afterwards.

X Q. 207. And you and Mr. Nelson talked over that process, did you not?

A. Which process?

XQ. 208. The process you were using.

A. We were putting the borax in the tank. He was there.

XQ. 209. And you and he talked it over before that work began and while it was going on?

A. Before it began. Well, he was interested in the installation of the machinery, yes.

XQ. 210. You talked it over with him before you began that process?

[fol. 311] A. I did not particularly. I talked it over with anybody that came to the office. I do not know whether he was there particularly to go over the process.

XQ. 211. He gave you suggestions, did he not, as to the strengths of solution to use?

A. No.

XQ. 212. Not particularly?

A. It followed from the Exhibit 50, the Azusa work followed the work or report that is reported in the Journal of Agriculture Research.

XQ. 213. During your association with Mr. Nelson at that time, you talked over this Brogdite matter at Strathmore and other places, did you not?

A. No.

XQ. 214. Never mentioned it?

A. Not in particular. If it was popular at that time, I suppose there might have been a conversation, but did Mr. Nelson know what the Brogdite was at that time?

XQ. 215. Did not he tell you that he did?

A. He did not.

XQ. 216. Did not he tell you what they were using at Strathmore?

A. He did not.

XQ. 217. And you never asked him?

A. I never asked him.

XQ. 217a. Well now, at Azusa in September and October of 1924, what was the apparatus that you were using, where you were putting the borax in a soaking tank, borax or boric acid, which was it?

A. Borax.

XQ. 218. And you were putting the borax in a soaking tank?

A. Yes.

X Q. 219. And what strength of solution were you using?

A. Anywhere from two and one-half per cent. I suppose, [fol. 312] to two and one-half per cent. I think possibly it got up to five per cent. at times.

X Q. 220. What temperature were you using?

A. Well, you will have to refer to the record.

X Q. 221. I have not any, Mr. Barger.

A. Well, roughly speaking, the temperature around 100 degrees.

X Q. 222. And how long did you keep the oranges in that tank, in that solution?

A. Well, it was three or four minutes.

X Q. 223. How did the oranges leave that solution, and where did they go after they left the solution?

A. They went to a brushing machine.

X Q. 224. What kind?

A. Cylindrical brushes.

X Q. 225. A series of cylindrical brushes, side by side?

A. On a slant.

X Q. 226. And the oranges ran down there and were brushed as they ran down, and were sprayed on, or poured on?

A. Sometimes.

X Q. 227. At first, when you started there, did you run water on these brushes?

A. Sometimes.

X Q. 228. Why sometimes?

A. We were experimenting.

X Q. 229. And what did you come to as the result; that is, did you find out it was best to run the water on the brushes or not?

A. There was no particular advantage in running water on the brushes.

X Q. 230. When you put water on the brushes, what water was it; was it fresh water or was it water from the soaking tank?

A. Sometimes fresh water and sometimes water from the soaking tank.

[fol. 313] X Q. 231. And where did the oranges go after that?

A. They had a towel there at one time. I do not know whether they kept the towel there, it was part of the time there, possibly they removed the towel.

X Q. 232. What would the towel do and where was it?

A. The towel is used in general use in California packing houses. The theory is to wipe the drops and make a film of water on the fruit, so that it will dry.

X Q. 233. Did you take a towel in your hand and pick up every orange and wipe every orange?

A. A mechanical effect.

X Q. 234. With the towel hanging loose?

A. A rotary towel, a roller towel, I think there are chains on the edge of it and it goes over a cog-wheel.

X Q. 235. Do you mean the oranges rolled onto this rotary towel?

A. Yes.

X Q. 236. And then what did you do with the oranges?

A. The orange goes through there to the drier.

X Q. 236a. Did you use any rinser?

A. Sometimes, that is the combination of sprays on the brushes would put the use of the rinser as we wanted it. We were getting the information on a commercial scale.

X Q. 237. This was all experimental work, was it?

A. Yes.

X Q. 238. It did not settle down to any commercial operation?

A. No.

X Q. 239. Now this time Mr. Nelson was connected with the California Fruit Growers Exchange?

A. Yes.

X Q. 240. And were others connected with the California Fruit Growers Exchange assisting you in this work?

[fol. 314] A. Yes, I think there were some of their grade inspectors.

X Q. 241. Who owned this Azusa house?

A. The association members.

X Q. 242. The association members?

A. The association of members. It is an association of grower members.

X Q. 243. And it is part of the California Fruit Growers Exchange?

A. Yes.

X Q. 244. I think you said this paper of yours, the second one that we were referring to a moment ago, you had first given in the course of a talk?

A. Yes.

X Q. 245. A talk to whom?

A. The citrus growers.

X Q. 246. In Florida?

A. In California.

X Q. 247. People of the California Exchange?

A. It was a public meeting.

X Q. 248. And did you talk more than once?

A. I think I gave a report to the Lemon Men's Club at one time, and I must have given a talk at San Bernardino.

X Q. 249. Did you make any analyses for the Exchange at any time?

A. No.

X Q. 250. Did you know of the Exchange analyzing Brogdite at San Dimas laboratory?

A. No.

X Q. 251. Was Mr. Hawkins at Strathmore with you?

A. No, sir.

X Q. 252. Was he at the Walnut Packing House with you?

A. No.

[fol. 315] X Q. 253. When you were at Strathmore, did you report to Mr. Hawkins as to what you had seen?

A. Mr. Hawkins was in California that winter and we were doing experimental freezing work and in fact a report of that is in that same Citrograph, I think.

X Q. 254. Did you report to Mr. Hawkins as to what you had seen at Strathmore?

A. He had heard from people around the State of a treatment being used and I mentioned to him what the Florida practice was and he said, "Well, I use borax," and he said, "I have a publication——"

X Q. 255. I really want an answer to my question. Did you report to Mr. Hawkins on what you had seen at Strathmore?

A. I spoke to him.

X Q. 256. Did you render him a written report?

A. Possibly in some written letter I mentioned it.

X Q. 257. Have you got that report?

A. No, it would be in the Washington file.

X Q. 258. You haven't it here?

A. No.

X Q. 259. Did you look it up recently?

A. No.

X Q. 260. And shortly after you had been to Strathmore Mr. Hawkins went down to Pasadena?

A. He was in Pasadena during January, the latter part of December and January, possibly, of that year. That was the freezing work going on at that time.

X Q. 261. January of what?

A. 1924.

X Q. 262. Did you ever see a copy of the report which Mr. Nelson made?

A. Report to whom?

X Q. 263. Did you ever see any report that Mr. Nelson made?

[fol. 316] A. Yes, in packing houses they have reports and up at the Exchange, with Mr. Dezell's signature, I think it reported some experiments, I think it was Strathmore, possibly.

X Q. 264. Did you ever see any reports that Mr. Nelson made?

A. This circular that I refer to, I have seen that some time.

X Q. 265. That is the Dezell circular. Did you ever see any report that Mr. Nelson made?

A. No.

X Q. 266. Is this the report you mean by Mr. Dezell?

A. Yes.

X Q. 267. That is Exhibit No. 61?

A. I got one of these just before I came East.

X Q. 268. Just before you came East this time?

A. Yes, that is the first time.

X Q. 269. Then what was the Dezell report that you said you had seen?

A. That is the Dezell report. That is signed by Mr. Dezell, isn't it?

X Q. 270. Yes. But you did not get it at that time.

A. Never had it.

X Q. 271. How did you happen to get it?

A. From the packing house.

X Q. 272. Did you receive it in the regular course of mail or did you go and ask for it?

A. I asked for it.

X Q. 273. How did you happen to go and ask for it at that time?

A. I was asked to bring it along.

X Q. 274. Did you bring it along?

A. Yes.

X Q. 275. That was after you received a telegram from Mr. Morton asking you if you would come East?

[fol. 317] A. Yes, sir.

X Q. 276. What other papers did you bring along with you?

A. I brought the original notes of the Azusa work.

X Q. 277. That was the work at Azusa in September and October, 1924?

A. Yes, sir.

X Q. 278. In your work there at Azusa, and your first attempts to use borax in connection with oranges, were they successful, those first attempts?

A. Yes, I understand it was fairly successful.

X Q. 279. What became of the oranges?

A. Some of them were shipped, I guess. That is, we carried on experiments in shipping and holding experiments.

X Q. 280. Do you not remember that you got too much borax on the oranges and they all had to be thrown away, one lot there?

A. No.

X Q. 281. What?

A. They probably should have been thrown away, but they probably marketed them.

X Q. 282. How did the surface of those oranges look?

A. Well, they sometimes got too heavy a coating.

X Q. 283. Coating of borax?

A. Of borax, yes. We were using borax. The boric acid combination was developed later.

X Q. 284. When you go around and give talks to the lemon growers and other people out there that you have been talking to, do you have to have the authority of the Department to do that?

A. No, not on local affairs. I would get the authority.

X Q. 285. You do get the authority?

A. Sometimes.

X Q. 286. Did you before giving these talks?

[fol. 318] A. I do not remember those.

X Q. 287. You do not remember?

A. No. Regulations change too often.

X Q. 288. Did you ever give any information to or make any reports or give any talks to the directors of the California Fruit Growers Exchange?

A. Not without invitation?

X Q. Did you with invitation?

A. At a public meeting. There were some directors there.

X Q. 289. Did you, on October 10, 1924?

A. I do not remember the date. I imagine that would be it. I discussed the Azusa work, I think, in December of 1924.

X Q. 291. A circular or bulletin of Mr. Dezell's, dated December 19, 1924, begins:

"At our directors' meeting on December 10th, a representative of the United States Department of Agriculture presented the results of experiments that have been conducted by the Department in the treatment of citrus fruit for control of decay from blue mold and green molds."

Was that you?

A. If it was at a public meeting it was I.

X Q. 292. It was you. Was that a written report? I do not mean report, a written communication.

A. Oh, it was published in the Citrograph. The charts in the Citrograph were exhibited at that meeting, the same report.

X Q. 293. Oh, it is the same thing that was in that Citrograph publication of November, 1924?

A. No, that is not 1924; the Citrograph publication for 1925.

X Q. 294. For 1925, yes.

A. The report was issued on the discussion of those charts of the Azusa work.

[fol. 319] Mr. Neave: Your Honor, there are a number of questions apparently that my associates want me to ask,

and of course I could ask them now and get them all mixed up. If Mr. Barger is going to be here tomorrow anyway I can shorten it a great deal by going over them.

Mr. Morton: I would like to ask Mr. Barger whether it is convenient for him to stay over. I have been promising him that he could get started back to California.

The Court: Then do you want to take a ten or fifteen minute recess so that that can be done?

Mr. Neave: Yes. But I do not want to——

The Witness: I would appreciate it.

Mr. Neave: That would accommodate you, would it, Mr. Barger?

The Witness: I would rather get through tonight.

Mr. Neave: It will not take but a few moments. I do not like to keep you waiting.

The Court: I do not mind. If you will let Mr. Mahaffy know I will come in when you are ready.

(After a short recess.)

X Q. 295. Mr. Barger, are you a chemist?

A. No.

X Q. 296. In the fall of 1923 or in the early winter had you not substantially completed arrangements to go with the California Fruit Growers Exchange?

A. No.

X Q. 297. You had not contemplated going with them?

A. No.

X Q. 298. Then or at any other time?

[fol. 320] A. No, it was never offered.

X Q. 299. Did you ever contemplate going with the Florida Citrus Exchange?

A. Yes.

X Q. 300. In the fall of 1923?

A. Fall of 1923.

X Q. 301. That is while you were in California?

A. No, I was in Florida.

X Q. 302. That was before you had gone out to California?

A. I made a trip to Florida in the fall of 1923.

X Q. 303. But you have told me before that you went to California in June, 1923?

A. I made a short trip to Florida and returned to California during the fall of 1923.

X Q. 304. I beg your pardon. And you had practically completed your arrangements to go with the Florida Citrus Exchange at that time?

A. Well, no, never completed. It was never completed.

X Q. 305. And you got word from the Department that you were to go out to California on some special work?

A. I was in California at the time.

X Q. 306. And did the Department urge you to take up some special work there?

A. No.

X Q. 306. The failure to complete your arrangements with the Florida Citrus Exchange, wasn't that due to the Department?

A. Due to a raise in salary.

X Q. 307. And were you given any special instructions at that time as to what work to do in California?

A. No.

X Q. 308. Were you instructed by the Department to look into this new process out there, the Brogdite process?

[fol. 321] A. No.

X Q. 309. Were you at that time or at any time?

A. No.

X Q. 310. The work you did looking into it was entirely on your own initiative?

A. The Department is very set about prying into private ventures that way. They like to see results but they don't —if there is any mechanics in the handling of the fruit and like that, those cannot be hidden but they certainly do not pry into the private part of a process. You will notice in the publications practically no reference to materials by name. We cannot publish or write anything by trade names.

X Q. 311. After you had seen the demonstrations at Strathmore in 1923 and at Walnut in January, 1924, did you write to your Florida associates about the results that you observed there?

A. No.

X Q. 312. Of course, you knew they were interested in blue mold decay?

A. Florida?

X Q. 313. Yes.

A. I was pretty familiar with the decay they had in transit and I was thoroughly convinced it has, and in some nature was a factor in Florida, in fact, I thought it was a reason why Florida growers had so little interest in careful handling methods which was due to the feeling that the fruit would rot by stem-end rot, so why try to preserve it from blue mold. That was an immature idea and I was not a pathologist and I am not a pathologist.

X Q. 314. I think that you said in your testimony with reference to some of the work that you have been outlining that you reported by letter to the project leader in Washington. Did you say something of that sort?

A. Dr. Hawkins is the project leader.

[fol. 322] X Q. 315. What do you mean by a project leader?

A. He is the immediate superior, my immediate superior.

X Q. 316. What was this work that you reported to him?

A. I wrote to him regularly, and I wrote up anything that comes up to my notice.

X Q. 317. I haven't got a copy of your testimony before me but what was it you said you did report to the project leader in Washington?

A. I said that it is possible in some of my letters I had written one. I think what you refer to, however, is the outcome of the first exptriment in which zinc chloride, lime and boric acid separately were used as treating materials.

X Q. 318. But wasn't Dr. Hawkins in California at that time?

A. The inspection of that fruit was—and by the time I had written—I imagine that was early summer of 1924 when I wrote to him.

X Q. 319. Have you got that report here?

A. I do not know as I wrote it to him. It would be natural for me to do it.

X Q. 320. Again in another portion of your testimony you were speaking about the brushes in the washers and you said that after the brushes were softened then something was done. What do you mean by the brushes being softened?

A. It is common practice in the houses, some of them, when they first start up the machinery in the morning, they soften these bristles on the washing machine; sometimes

better arrangements are made, where considerable water is put on the bristles, but the feeling, well, it is general, that is a good many houses, an average number of houses, the least amount of water is put on the brushes, they have that practice, they want to get the minimum amount of [fol. 323] water. Other houses go the oppoiste way. It is just a personal opinion of the house.

X Q. 321. After you softened the brushes in the morning you did not put any water on the rest of the day?

A. They minimize the amount of water.

X Q. 322. Where did you see that done?

A. At Azusa you can see it in a number of houses.

X Q. 323. Where, in California?

A. In California.

X Q. 324. Will you mention where they have done that?

A. I do not recall. I remember one which is—let's see—take the Elephant Orchard House, take the house around Greenspot and North of Redlands, and Crofton—I don't know the official names of those houses.

X Q. 325. At Azusa they were making the experiments that you have been testifying about, and at that time did you use the same tank that had been used there before you started your borax experiments?

A. Yes, we added to it.

X Q. 326. What did you add to it?

A. Another tank.

X Q. 327. Tell me just how that was added?

A. We put a longer tank alongside of the original soaking tank and the brushes were in a line. The dump was at the end of the original soaking tank. There was space to the west of the original equipment and we put in an additional tank there. We connected these two tanks by an elevator cross belt conveyor.

X Q. 328. Did you have the borax solution in both of those tanks?

A. In both tanks.

X Q. 329. And the result of that was then that the oranges would enter one end of the old original soaking tank, go through it, and then go to the new soaking tank and through it and then to the brushes?

[fol. 324] A. No, they entered the end of the new soaking tank, go out of that and then returned to the end of the old soaking tank.

X Q. 330. And go through it and then to the brushes?

A. That was varied for experimental purposes and we varied—we could use a short dip with the long dip at will by using either one or both tanks.

X Q. 331. Now, in talking about that morning and afternoon that you spent at the Strathmore Packing House, you spoke of an anteroom. I suppose you mean some room adjoining that in which the experiments were being carried on?

A. Yes, there was another room there.

X Q. 332. And you went into that room frequently, did you not?

A. I do not remember.

X Q. 333. Do you not remember you went in there to smoke with the others?

A. Possibly I did, I do not know.

X Q. 334. And that is where this powder-like stuff was kept; or the flour-like stuff?

A. Was it? I don't know. I didn't pay any attention to that. In fact there was no—even if there had been anything in there, the impression was that it was quite an elaborate process, as I remember it; and that it would take quite a number of barrels and everything if they were there.

X Q. 335. We were speaking a moment ago about this process of softening the brushes?

A. Yes.

X Q. 336. It was after the brushes were softened that you did not put more fresh water on or did not put much on? That is the present practice, is it?

A. You find it in a number of houses.

X Q. 337. How far back do you know that practice goes? [fol. 325] A. I do not know but just from my own experience with citrus fruit. I have not quizzed anybody on how long they used it.

X Q. 338. From your own experience, that is all I am asking.

A. How long?

X Q. 339. Yes.

A. Well, I really can not say the first house—I cannot remember the first house I saw that done in. I have seen different amounts of sprays on brushes and I have heard people theorize on the reason for different amounts of sprays on the brushes.

Mr. Neave: All right. I think that is all.

Redirect examination.

By Mr. Morton:

R. D. Q. 340. Mr. Barger, is this practice of softening the brushes with the minimum amount of water, confined to houses using the borax solution, in your experience?

A. Oh, no. No, that is one thing that economics, I suppose, has something to do with. Water costs money in California.

R. D. Q. 341. Who is this man Nelson that you have been referring to?

A. He is with the Field Department of the California Fruit Growers' Exchange.

R. D. Q. 342. Did he have that position at the time of the experiments which you witnessed of Mr. Brogden's?

A. Yes.

R. D. Q. 343. In what capacity did you understand that he was there?

A. They changed representatives to convince themselves that the process would produce results. I think that is the theory that they worked on. Instead of having a commercial concern going out and selling the individual packers, [fol. 326] they would rather have them sell the field departments first, if you understand me. That is, convince the field department first and let them make recommendations if a thing is of benefit to the industry.

R. D. Q. 344. Did Mr. Brogden or any of his associates at any time tell you what was the composition of this so-called Brogdite material?

A. No. Mr. Brogden never told me the composition of the material.

R. D. Q. 345. Did you understand from what was said and the general situation that that was a secret formula?

A Yes, I was under that impression.

R. D. Q. 346. Do you know whether Mr. Nelson knew what was in the Brogdite from any conversation you had with him?

A. I doubt very much whether he knew what was in it. He never told me what was in it.

R. D. Q. 347. In discussing it with you, if he did discuss it with you, it was his impression that he also regarded it as a secret process?

A. Yes.

R. D. Q. 348. Is it your practice as an individual or your policy, or is it the policy of the Department of Agriculture to endeavor to obtain, surreptitiously knowledge that is kept from them?

A. Why, no. That would be condemned by the Department.

R. D. Q. 349. Did you make any effort whatsoever to find out the composition of this so-called Brogdite material?

A. No, I could not have made use of it if I had found out. We can not publish—sorry it is the aim of the Department to write publications—and we are looking for things to write about, but we can not take things labeled by tradenames and get any credit for it.

[fol. 327] R. D. Q. 350. Was it the fact that chemical treatments, or a chemical treatment was under discussion in California that led you to start in on this line of work?

A. Yes.

R. D. Q. 351. When was the first time that you called any of your experiments to the attention of Mr. Nelson?

A. I do not know. I think the first time that any of those gentlemen became aware of much work being done, that is, any detailed work being done in the laboratory we had there at that time, was, oh, I imagine August of 1924. That was after I had submitted the first draft of this Journal of Agricultural Research paper, submitted at Washington. It was after that work had been completed and shaped up and sent to Washington.

R. D. Q. 352. Did Mr. Nelson ever have any connection with your work other than as an observer of the Exchange?

A. He had no connection, absolutely no connection with the first publication which was in the Journal of Agricultural Research.

R. D. Q. 353. After that what connection, if any, did he have?

A. After that the commercial application—we were working together to see whether borax would do a good job of preserving citrus fruit.

R. D. Q. 354. He was working solely in the interest of the Exchange and you were working as a representative of the Department of Agriculture?

A. Yes, trying to apply commercially the ideas I got from the laboratory experiments that were reported—that were

finished before it was associated or before any work with Mr. Nelson.

R. D. Q. 355. Do you know how long Mr. Neslon has been connected with the Exchange in California?

[fol. 328] A. Soon after Mr. Ramsey took the position with the Exchange, Mr. Nelson was with Mr. Ramsey in the Department at the time. Mr. Ramsey had charge of the transportation work, I believe, and Mr. Ramsey resigned and went to the Exchange, and soon after that Mr. Nelson went with him, resigned from the Department to go with the California Fruit Growers Exchange. I imagine it was 1918 or 1919. I am not positive, though; never paid any attention to it.

R. D. Q. 357. That was some time before you had any particular interest in the citrus industry?

A. Yes.

R. D. Q. 358. You have read over this circular, Plaintiff's Exhibit No. 61, gotten out by the Exchange in June, 1924?

A. No, I paid no attention to that. My impression is that it is a report showing the marked control of mold, which surprised Mr. Dezell and gives some idea of the cost of equipment—something to do with royalties, I guess.

R. D. Q. 359. I want to know primarily, if you are familiar with the subject at all.

A. No, I do not know about the details at all.

Recross-examination

By Mr. Neave:

R. X Q. 360. From whom did you get the copy of the Dezell circular that you brought on with you?

A. From the packing house people.

R. X Q. 361. What packing house?

A. The packing house people. I did not have any direct.

R. X. Q. 362. But that packing house is where you are doing some of your work now?

[fol. 329] A. Yes. My laboratory is on their property, I rent the laboratory from them.

R. X Q. 363. Is that where you conducted your experiments on the zinc chloride and so forth?

A. In Lamanda Park.

R. X Q. 364. The same place?

A. Yes.

(Witness excused.)

CARL LUCAS ALSBERG

CARL LUCAS ALSBERG, was called as a witness on behalf of the defendant, having been duly sworn, testified as follows:

Direct examination.

By Mr. Morton:

I am a director, Food Research Institute of Stanford University. I was Chief of the United States Bureau of Chemistry from the end of December, 1912, till the 1st of July, 1921. Before that time I was chemical biologist in the Bureau of Plant Industry.

I hold degrees of Master of Arts and Doctor of Medicine from Columbia University, and I was a student of Chemistry and Pharmacology at German Universities for something under three years. I was a member of the Faculty of the Harvard Medical School for six years, and part of that time head of the Department of Chemistry of that Faculty.

Blue mold is a general term applied to a class of fungi, consisting of a large number of species that when they fructify they produce spores which have a color that varies from blue-green to different shades of green. The first accurate or approximately accurate description of that [fol. 330] type of mold, segregating it from other molds, was made early in the nineteenth century by a man by the name of Link, a botanist who first described as a species penicillium glaucum. His description is general, and it is not possible at the present day to say exactly which one of the many forms of penicillium that have blue or green spores. He actually had no observation on which he based his description. The result is that botanists of recent times have either abandoned that term altogether, or have restricted it to one of the many species, and have recognized and established a considerable number of other species, all of which have blue-green, or green spores; so that today penicillium glaucum is either not a recognized

species for some botanists, and for others just one species. Some years ago it was a term which was used for a large number of species.

You can find one or the other species of this genus of penicillium on a large variety of organic matter. It may be found on pretty nearly any kind of food. It may be found on other forms of organic matter. Different species are more common on one kind of organic matters than on another. As a rule it attacks only dead or injured tissue.

The first use of borax as a food preservative that I know of, goes back to the latter years of the sixty's of the last century, along '67, '68 and '69. It came to be used as a food preservative. It had of course been known long before that in medicine. It was used for many things in medicine, and had been used as a wound dressing, for its antiseptic qualities long before that time; but it was first used in food that I know of, and its use developed in Sweden, by a man of the name of Gahn, and it developed rapidly and was widely adopted, and by the '90's was so extensively used that it became a matter of very serious consideration from the standpoint of public health, be- [fol. 331] cause it was so widely used in all kinds of foodstuffs.

I am not certain what country was the first to pass an act regulating the use of borax but my impression is—I never looked up to see the dates exactly—that the English permitted it, first restricted it, did not prohibit it, but permitted it under certain restrictions along about 1900. Germany followed shortly thereafter, and if my recollection serves me right, prohibited its use entirely.

The United States after the beginning of the enforcement of the Pure Food Law—the law having been enacted in 1906, as I recollect it, no penalties however to be enforced under it until the 1st of January, 1907—the United States passed regulations or at least issued regulations under that act which excluded boric acid from use as a preservative in foodstuffs.

I think it is the fifth section of the portion of the law which deals with adulteration in the case of foods. That section provides that the food is declared to be adulterated "if it contain any added poisonous or other added deleterious ingredient which may render such article injurious to

health: Provided, That when in the preparation of food products for shipments they are preserved by any external application applied in such a manner that the preservative is necessarily removed mechanically, or by maceration in water, or otherwise, and directions for the removal of said preservative shall be printed on the covering of the package, the provisions of this act shall be construed as applying only when said products are ready for consumption." (Paragraph 8723, U. S. Compiled Statutes 1918, Act of June *31*, 1906, Chap. 3915, Section 7 34 Stafutes at Large, 767.)

Under that provision of the law, which does not specifically mention borax, the Department expressed the opinion that borax being a deleterious substance in itself, none [fol. 332] could be added to food as a preservative, with that proviso, of course, which is in the law. That declaration of course was made by the Department when Dr. Wiley, my predecessor as Chief of the Bureau of Chemistry was in charge. It was enforced during all the years that I was Chief of the Bureau of Chemistry.

The act provides that the technology work done in connection with its enforcement shall be done in the Bureau of Chemistry of the Department of Agriculture. Of course, the act does not give the Bureau of Chemistry any power to exclude anything. That is a power that the courts pass on.

My recollection is that the work to be done by the Bureau of Chemistry is referred to in Section 8720 which reads:

"The examination of specimens of food and drugs shall be made in the Bureau of Chemistry of the Department of Agriculture or under the direction and supervision of such Bureau for the purpose of determining from such examination whether such articles are adulterated or misbranded within the meaning of this Act; and if it shall appear from any such examination that any of such specimens is adulterated or misbranded within the meaning of this Act, the Secretary of Agriculture shall cause notice thereof to be given to the party from whom such sample was obtained."

Then it provides further procedure under that act. Immediately after the passage of the act, it was the attitude

of the Chief of the Bureau of Chemistry, Dr. Wiley, at that time, that substances that were deleterious might not, under the provisions of the law, be added to a foodstuff in any quantity whatsoever, however small, and Dr. Wiley held that that was the interpretation of the law.

[fol. 333] The issue was raised on that theory of interpretation of the food law repeatedly, and finally a case in which the adulteration of flour was alleged, due to the addition of nitrous oxide in bleaching, was tried, and finally it reached the Supreme Court of the United States, in which this was one of the charges, the quantity of nitrous oxide in the flour which was used in breaching being very small. I have forgotten the exact amount, but it was a few parts per million.

The case came to trial before the Chief of the Bureau of Chemistry a year or so before I became chief. I had nothing to do with the preparation of the case or the trial of the case It was being appealed at the time that I became Chief of the Bureau of Chemistry, and the Supreme Court handed down its decision after I had become Chief of the Bureau; and in that decision it was held that it was incumbent upon the Federal Government, in charging adulteration by reason of the presence of the added deleterious ingredient, that it must prove that the addition of this deleterious ingredient, might make the article of food deleterious to some one, whether it be a child or an adult or a man or a woman or an old person or a sick or a well person, and that of course necessitated a change in the character of the enforcement of the food law.

I do not remember the date, and I cannot tell you offhand the exact name of the defendant. I think it was the Lexington Mill and Elevator Company.

The case occurred in 1910 or 1911, or something like that, before I became Chief of the Bureau. The decision was handed down—there again I cannot give you the dates—within a year or two of my becoming Chief of the Bureau. Of course, it is a matter of record. The Department published a notice of judgment giving the reprinting of the decision of the Court.

It would be difficult to give a complete list of the food in which borax was, prior to the passage of the food law, [fol. 334] commonly used as a preservative, I can oly give those that I can recall. It was widely used as a preserva-

tive in various kinds of meats, particularly in smoked and salted meats that were prepared for export. It was used in sausage meat; it was used in milk; it was used on the outside of cheeses or to impregnate the cloth with which certain types of cheese are wrapped; it was commonly used in butter, in cream, for the preservation of oysters and lobsters, shrimp; it was used in wine, beer; it was used in the preservation of fruit juices of various kinds; it was used to help sterilizing process in canning; it was sold as a canning compound to the housewives of the country and was sold for that purpose as late as 1916, 1917 or 1918.

These canning compounds I happen to know about, because when I left the Bureau of Chemistry we had pending an information against a manufacturer of a canning compound which was about 95 per cent.—I do not remember now whether it was borax or boric acid, it would not make any difference—and 5 per cent common salt that was called I think Mrs. Price's Canning Compound. I do not know what became of the case because it was pending when I left the Bureau of Chemistry. That was sold to women so that their canned goods when they were putting up fruits and preserves and anything else that they put up, would not spoil, and had a very wide sale, and we caused a number of investigations, or at least I caused a number of investigations to be carried out in that connection to determine whether it was effective.

There was some question of the manner in which it might be brought under the jurisdiction of the food law in its being a preservative rather than a food as such. We wanted to prove that its use would be deleterious to health and I had studied its action on various kinds of organisms [fol. 335] that caused the spoilage of food. Some of these results have been published.

Then in my personal experience, some of what I have given is out of the literature, because with the passage of the food act the use of borax became less common, in fact, it became very unusual, and my own experience with borax in food and things that I know myself and not out of the literature, is that in my time it was found by the bureau in butter, in fresh, or at least, cooked fresh shrimps, on cheese, on imported canned lobster, in imported fruit

juices, and in preparations of rennet—that is a stomach extract from the calf which is used in cheese-making.

During the war, for example, borax being permitted to the extent of one-half of 1 per cent. in England—it has recently been eliminated, I understand, but until recently it was legal in England to use one-half of 1 per cent. of borax in butter—during the war in New Zealand and in Australia there was not a ship available to send their butter to England, which is their common market, so that a good deal of it was diverted to the Pacific Coast of North America and offered for entry into the United States.

The Bureau of Chemistry which has jurisdiction on the technological side for the entry of imported foodstuffs as well as the interstate traffic in foodstuffs, finding borax in this Australian and New Zealand butter, it had it excluded from entry into the United States and it was transhipped up to Canada, where it was admitted.

The Australian and New Zealand dairymen then took the matter up through Washington, and learning what was required, thereafter made butter for the period of the war or as long as their general market was closed to them, without borax, so that a good deal of that butter came into the United States without any borax. Some of this butter that we excluded contained very small quantities of borax, [fol. 336] because we felt that an article like that, in which borax was unnecessary, which the consumer did not expect, there was no good reason for any material quantity at all.

Of course, when dealing with an imported food the situation is different from dealing with food in interstate commerce, because under its sovereign rights the United States has the power to exclude from the country anything that it chooses and the exclusion of an importation like that is not subject to appeal excepting to the Executive officers; in other words, we were not in that case held by the decision of the Supreme Court.

Borax is a salt of the base sodium, which is to be found in common table salt, with boric acid, which is a combination of the elements boron and oxygen. So it is sodium borate or, as it is sometimes written, biborate. As it comes on the market it contains ten molecules of water of crystallization ordinarily. The manufacturer of borax,

naturally, desires to sell a product which contained a maximum amount of filler, in this case water. That water is held chemically as water of crystallization.

The chemical formula of borax is $Na_2B_4O_7$. If you consider the water of crystallization you would write it plus 10 H_2O.

Boric acid is a combination of hydrogen, boron and oxygen in the proportion of H_3BO_3, which is an acid capable of combining with a base like sodium or potassium. Its characteristic element, the thing that distinguishes it from other acids, is that it contains boron—the element boron. It is a very weak acid, very weak.

There is in my opinion, and I think the literature is consistent with that opinion, very little difference in antiseptic action, or perhaps it would be better to put it inhibiting [fol. 337] action, on micro organisms between boric acid and borax. It depends of course upon how you calculate it. Boric acid has a much larger percentage of boron than borax which contains in addition—you see in boric acid you have one boron to three of hydrogen and three of oxygen. In borax you have four borons to two of sodium and seven of oxygen and ten of water. So the percentage of boron in boric acid is a little higher than it is in borax, and if you figured on boric acid there is very much more of the boron contained. There is not a great deal of difference. The difference is rather in favor of boric acid if you figured on the percentages by weight without considering the active ingredient, which is the boron, or at least boric oxide; then you will find that there is a little difference. The borax is a little—is on that basis a little weaker than boric acid.

In other words, figures on the boron alone, the boric acid is a little stronger. Figured on the borax as a whole, the borax is a little weaker, and the experiments and the literature indicate that for the organisms studied, borax is a little weaker than boric acid but the action is the same as the action of boron. If it were not the same, then you would expect other salts of sodium, like ordinary table salt, to have the same action that borax does.

The characteristic thing of borax and of boric acid, is that both have boron; it is obvious that its action must depend upon the boron content.

This circular issued by the United States Department of Agriculture, Department Circular No. 237, is a report on some of the experiments that were conducted on instructions from myself in preparing the case against the manufacturers of this canning compound which I mentioned some time ago. These experiments were conducted to see whether borax, or boric acid at least, as found in this can-[fol. 338] ning powder, which consisted according to the analysis—let me see if I find the analysis here—of 95 per cent. boric acid and 5 per cent. common salt; to see whether that canning powder was effective for what it claimed to do. And, in order to determine that, it was used as it was directed that it be used by women in canning, and the result examined bacteriologically. In that connection, its effect on various bacteria and various molds such as would contaminate foods of all kinds, was tried. It was tried, as will be seen from page 4, on eight different species of penicillium molds, and it was found that it delayed the growth of that mold in the concentrations used, which varied from a little over six-tenths of a per cent. to nearly nine-tenths of a per cent.; that it delayed the development of these species of penicillium, and in some cases, it prevented their growth altogether.

The conclusions reached—well, the conclusions reached do not happen to have very much to do with the case at issue. It was also shown that the organisms which are dangerous to health and food were not so much inhibited as the more harmless organism. That has nothing to do with this issue.

On page 4 of the bulletin I find the reference to this action on the molds of the penicillium group, and if I may correct what I said a moment ago, and read one sentence at the conclusion which does bear on it, and which is found on page 5:

"Clearly, then, the boric-acid canning powder in question has a selective effect on molds also, both in reducing the number of species which will germinate and in delaying or restricting the development of others, but it will not entirely eliminate spoilage due to certain common species of mold."

That is the particular part.

[fol. 339] Mr. Morton: I offer the circular in question in evidence, and it is agreed that it was issued in the month of August, 1922.

(Received in evidence and marked "Defendant's Exhibit No. 10.")

In Bulletin of the Department of Agriculture, No. 109, I find reference to the action of borax or boric acid on molds of the penicillium group.

This is a Bulletin by R. H. True, entitled "The molds of cigars and their prevention." In this bulletin Dr. True, who was my immediate superior when I first came into the Department of Agriculture, was asked to find some remedy which would prevent mold on cigars, which the industry was troubled with. This investigation was begun five or six or seven years prior to this date of publication, and Dr. True was still in the Bureau of Soils, as I recall it. He was later transferred to the Bureau of Plant Industry, and he reached these conclusions contained in this bulletin, long before publication, and had the remedies which he suggested tried practically in cigar factories for a number of years so as to make sure that the recommendations which they might make would be sound and practicable. He reached the conclusion that the trouble came from the paste which is used in gumming the ends of cigars rather than from anything on the tobacco, and he states on page 5 of that bulletin:

"It will be seen that the organisms responsible for the most serious trouble (Aspergillus candidus, easily first in importance, and Penicillium glaucum) are not represented in the list of organisms introduced on the wrapper leaf, but seem to be always present in the tragacanth gum. The con-
[fol. 340] clusion seems, therefore, to follow that in the case in hand the paste used in fastening the wrapper at the head of the cigar brought with it the troublesome organisms."

Penicillium glaucum, you may recall, was the old generic name of this group of molds, and in preventing the growth of these molds in the paste, a number of well-known antiseptics were tried and among them boric acid. The conclusion reached is on page 7, bottom of page 7:

"After considering which of these substances should be recommended for geenral use, boric acid was chosen because it is cheaper, does not undergo change in the paste, is more readily obtained, and is not liable to injure anybody if used in excess. The disadvantages of hydro-quinone lie in its contrasted properties on the points enumerated."

The final two paragraphs of the bulletin give directions for preparing the paste with boric acid, and the final paragraph says:

"These directions have been followed for some years in the factory in which the complaints originated, and when the writer was last in communication with those in charge the boric-acid treatment was in use as a routine practice and only in rare instances were molds found troublesome."

Mr. Morton: I offer in evidence the bulletin just referred to, No. 109, which it is agreed was issued in 1914.

(Received in evidence and marked "Defendant's Exhibit No. 11.")

By Mr. Morton:

Q. 27. For what purpose is borax or boric acid used in the wrapper of cheesecloth on cheese?

A. To prevent the development of objectionable molds and other organisms on the outside of the cheese, so that [fol. 341] they would not get kind of furry coatings which sometimes form on the cheese.

Q. 28. Will you please take up your volume there of patents and publications which have been pleaded and refer first to the publications, beginning with the annual report of the Commissioner of Agriculture of the year 1878, and the publications immediately following, and point out briefly just what is disclosed in those publications that is pertinent to this case?

A. The statement is recorded, on page 577 of the report:

"The antiseptic virtue of borax being well known as well as the experiments to preserve meat and other eatables by its aid, it occurred that it might be substituted in butter in place of common salt. On trial it was found not to change

in the least the flavor of the butter and indeed preserved it admirably."

Lower on the page is a description of how Professor Becki used it in his home.

Mr. Morton: I offer in evidence the pages from the report, the title page and page 577, which is agreed was issued in the year 1878.

(Received in evidence and marked "Defendant's Exhibit No. 12.")

A. (continued). The next one is from the Journal of Practical Agriculture, D'Agricultûre Pratique, a French journal of the year 1883, in which as you will see from the translation on page 75, borax is recommended for the treatment of diseases of the grape vine, which was at that time very serious in France. I may say in addition that this disease is also a fungus disease not closely related to the penicillium but to a fungus.

[fol. 342] Mr. Morton: I offer in evidence the title page and pages 75 and 76 of the D'Agriculture Pratique, which it is agreed was published in the year 1883, with the translation annexed.

(Received in evidence and marked "Defendant's Exhibit No. 13.")

A. (continued). The next few papers which are here cited deal with the effect of borax or boric acid on penicillium. The first of these is by Mrs. Katherine Golden Bitting, entitled "The Effect of Preservative on the Development of Penicillium."

I draw your attention particularly to the first paragraph in which the statement is made that in examining ketchup for the organisms present, it was noted that the hyphæ of molds in preserved ketchup were swollen and distorted. Hyphæ are the threads of the molds.

"In many of the brands of ketchup the mold present was the common blue mold or penicillium. As this mold is apparently omnivorous in habits, thriving and fruiting on many media and fruits normally in a saturated atmosphere, is regular in its germinative power, and so far as known,

constant in form, it was selected to determine the effect of sodium benzoate, used in varying quantities, on its structure and development. The media used in the experiments were tomato bouillon, tomato gelatin, and tomato pulp, and were selected because the tomato juice and pulp are present in ketchup, and also because they do not alter the toxic properties of the agnts used toward the fungus. Afterwards the condiments used in ketchup were tested and also the ordinary food preservatives, though not so extensively as the sodium benzoate. In these latter experiments, tomato bouillon was the only medium used."

Mrs. Bitting was an employee of the Bureau of Chemistry in Dr. Wiley's time and was an employee of the Bureau of [fol. 343] Chemistry for a year or so after I took charge. Dr. Wiley regarded sodium benzoate quite as objectionable as boric acid but the matter was referred by President Roosevelt to a Board of Scientific Experts who repeated Dr. Wiley's experiments and came to somewhat different results and recommended that sodium benzoate be permitted as a preservative, a ruling in which Dr. Wiley never acquiesced; and this investigation was carried on on sodium benzoate in connection with that preservative, borax being somewhat accidental.

The tables will show that the penicillium was adversely affected and in concentrations of around one-half per cent there was no germination in some of the tests. You will notice there are blanks under the one-half per cent concentrations in the borax experiments in some cases.

But the conclusions reached on page 410, the last paragraph, show:

"All of the other chemicals tested acted as poison on the protoplasm, retarding development and causing abnormal swelling and disorganization of varying degrees of intensity on both the protoplasm and cell membrane."

That means the protoplasm and cell membrane of the mold. —

Mr. Morton: I offer in evidence the title page of proceedings of the Indiana Academy of Science for the year 1909 and pages 391, 400, 401, 403, 408, 409 and 410, which it is agreed was published in 1910.

(Received in evidence and marked "Defendant's Exhibit No. 14.")

(A. (continued). The next one is a publication in German by two Dutch scientists, Boesceken and Waterman, pub-[fol. 344] lished in a Dutch publication, which, however, is printed in German. The Dutch scientific papers are published in German, French or English since so few people read Dutch.

This is an investigation which does not concern itself whatever with the question of action of preservatives as such. It is a purely abstract investigation, designed to get at the mechanism of action of boric acid, to see whether a certain theory of the action of toxic agents perhaps can explain the action of boric acid, and in order to carry out this investigation they used as the test organism penicillium.

They added varying amounts of boric acid to cultures inoculated with mold spores, cultures of different kinds, and they found that very small quantities of boric acid inhibiting effect upon the development of Penicillium glaucum. They also studied the Aspergillus niger, which is the most closely related genus to penicillium glaucum; the two growths Aspergillus niger and the penicillium are usually grouped under the order asperi, it contains the two geni.

These conclusions are significant and are found in the summary which is on the next to the last page. These conclusions read in part:

"We ascertained: 1. That boric acid, even in extremely low concentration (plus 0.06 per cent), has a distinctly inhibiting effect upon the development of Penicillium glaucum, and that this deleterious concentration is much higher in the case of Aspergillus (0.5 to 1 per cent)."

In other words, Penicillium is more sensitive to boric acid than is closely related form Aspergillus. The other conclusions are of a purely theoretical nature.

Mr. Morton: I offer in evidence the article entitled "Folio Microbiologica," with translation attached, which [fol. 345] it is agreed was published in the year 1912.

(Received in evidence and marked "Defendant's Exhibit No. 15.")

A. (continued). The next item is from a book by E. Bourcart, translated from the French by Donald Grant, entitled "Insecticides, Fungicides and Weed-killers."

That book discusses borax, $Na_2B_4O_7$ and its actions. It says it is used to preserve meat and putrescible liquors, and a little lower down makes a statement which is not entirely consistent with the statement I have made.

"Wenckiewicz found that it had no action on Penicillium glaucum until its solution reached 1.4 per cent."

That is a discrepancy which may be due to any one of a number of reasons. They may have had different kinds of Penicillium; they may have worked on different Penicillium cultures; they may have worked under different conditions, or there may be an actual error.

Mr. Morton: I offer in evidence the title page and pages 109 and 110 of the book "Insecticides, Fungicides and Weed-killers," which it is agreed was published in 1913.

(Received in evidence and marked "Defendant's Exhibit No. 16.")

A. (continued). The next is a paper or a report again by K. G. Bitting, entitled "The Effect of Certain Agents on the Development of Some Moulds." In this case among the molds used was Penicillium expansum, which is a mold of this group commoner on apples than it is on citrus fruits, [fol. 346] but very closely related to those on citrus fruit. If you will glance at the *the* table you will find that boric acid and borax in relatively small concentrations delayed the development of penicillium as compared with growth in the absence of these agents. As a matter of fact, I am in error with reference to that. Boric acid only was used. No, both of them were used in the case of penicillium; boric acid and borax.

"The results of the tests with these preservatives show the acids to be stronger in all cases than the corresponding salt."

And it cites literature in harmony with that, and also that the benzoic acid was the strongest antiseptic in its action on the three molds. Of course, we are not concerned

with benzoic acid here; and on the last page, 51, the bottom of the first paragraph, the last two sentences, it says:

"There was a decided retardation of development by even small amounts, and in some of them a yellowing or browning of the protoplasm. In the extreme stages the hyphæ were much swollen, and filled with a coarsely granular, non-hyaline mass, showing no distinction of ectoplast, and on rupture, spreading as a disintegrated mass."

And that refers to acetic, benzoic, boric and salicylic acids and their sodium salts.

Mr. Morton: I offer in evidence the title page, pages 24, 25, 26, 27, 46, 47 and 51 of the article, "The Effect of Certain Agents on the Development of Some Moulds," which is agreed was published in 1920.

(Received in evidence and marked "Defendant's Exhibit No. 17.")

[fol. 347] The next one is an article in the report of Comptes-Rendus of the French Academy of Science in 1892, by J. Morel, who studied the action of boric acid on the germination of the seeds of ordinary domesticated plants and came to the conclusion that boric acid and borax—or at least he worked with borax, as it happens; he worked with both—he came to the conclusion that the action of borax was altogether comparable with that of boric acid under the same conditions which seems to indicate the soda acts in the same way as boric acid:

"One is now in a position to predict—and I am carrying out a certain number of experiments along these lines—that boric acid acts strongly on the lower fungi and related organisms, the growth of which will probably be completely inhibited by even very weak solutions.

"If these assumptions shall be corroborated by facts boric acid will be able to take a place by the side of copper sulfate to combat the mildew of the grape-vine and the smut or wheat, perhaps also anthracnose, oidium and other diseases due to cryptogamous organisms which infest useful plants."

By cryptogamous organisms he means the low types of plants which are not green and of which the fungi are a part.

Mr. Morton: I offer in evidence the title page, pages 131, 132 and 133 of the volume of "Comptes Rendus," published in 1892 with translation attached.

(Received in evidence and marked "Defendant's Exhibit 18.")

The first of the patent is Patent No. 67921, issued August 15, 1867, to Lewis H. Spear. It claims to cover a method for preserving animal or vegetable matter, and gives the method of preparing the four different kinds of solutions [fol. 348] which are enumerated in the second column of the first page of the patent for the preservation of such material. One of these four solutions consists essentially of borax—the saturated solution of borax; the other is a solution of boracic acid. Then in the rest of the patent are given methods for using these four solutions, and it is interesting that the preservation of fruits and vegetables is specifically mentioned on the bottom of the second column of page 2. Evidently the patentee recommends his solutions for the preservation of vegetables with heat, with par-boiling and claims that with the use of his invention the vegetables can be preserved without hermetically sealing; that is to say, without a process which we know as canning.

Mr. Morton: I offer the last patent.

(Received in evidence and marked "Defendant's Exhibit No. 19.")

The Witness: The next patent is No. 161,944, dated October 14, 1874, and issued to Henrik Gahn. It deals with the use of a preparation consisting of boracic acid and alum, varying in proportion to circumstances of one part of alum to 20 per cent of boracic acid, and between that limit and the limit of ten parts of alum and twenty parts of boracic acid, and it is claimed to be useful in the preservation of raw food, fruit and other vegetable products, and the patent contains directions for the use of this preserving power or substance.

It states that when the preservative is to be applied by dipping the article into a solution of the preservative, he recommends or prefers a solution of the strength of eight to ten ounces of the powder to a gallon of water or as much as the water will dissolve. In other words, he recommends a saturated solution for preserving the substance.

[fol. 349] Mr. Morton: I offer in evidence U. S. Patent No. 161,944.

(Patent No. 161,944 received in evidence and marked "Defendant's Exhibit No. 20.")

The Witness: The next is Patent No. 187,956, dated August 1st, 1876, to Charles G. Am Ende, which purports to preserve all kinds of meats, vegetables and the like from injury by germs of putrefaction by means of a composition consisting of a small portion of chloroform and a large proportion of boracic acid. It mentions specifically protection against fungi and algæ.

Mr. Morton: I offer in evidence U. S. Patent No. 187,956, to Charles G. Am Ende.

(Received in evidence and marked "Defendant's Exhibit No. 21.")

The Witness: The next is Patent No. 199,209, dated January 15, 1878, application filed November 1, 1877, issued to Fabien Jourdes. It purports to consist of an improved compound for preserving animal matters such as greases, meats, butter, milk, fish and leather, and also vegetable substances such as oils and fruits. It consists of a mixture of alum or bisulphate of alumina and potash, sulphate of lime, and biborate of soda, or trade borax in about equal proportions. It is significant that it contains this statement:

"When the butter is to be preserved for a short time only it may be enveloped in a sheet of unsized paper, (filtering paper) previously dipped into a concentrated solution of the three salts."

It gives direction for the preservation of eggs by immersing them in the solution and it mentions specifically that milk can be preserved by this solution. It also contains [fol. 350] the interesting statement:

"I am aware of the fact that alum and borax have been heretofore used in connection with each other in preserving compounds, and also that powdered sulphate of lime has heretofore been used for preserving purposes."

He therefore limits his claim to the combination.

As to what effect the use of alum in conjunction with borax or boracic acid would have on the preservative action of the boric acid or borax, I would say alum has no preservation action. It has a tanning and hardening effect, and is so widely used. For example, it is a common thing in the making of vinegar or salt pickles, to use alum, so that the pickles remain firm through the winter and do not get soft and mushy, and now these articles which are preserved with borax or boracic acid are liable to soften and get a brown crust over the outside if they are packed dry in borax, as some of these patents provide, and the alum by tanning and hardening the tissues of the material has a tendency to counteract that effect. That is clearly recognized in the English patent granted to this same patentee that we will come to later, in which it is specified why alum is used, and the literature of that time describes that this man Gahn put on the market a preserving preparation under the name of Aseptin which analysists who analyzed it at that time, report to be in three forms, one without any alum, used in things like milk, and one with a small amount of alum, and another with a larger amount of alum. They were put on the market in those three forms, and he explains why he uses alum in the English patent as alum has only the preserving action in so far as by toughening the thing it makes the entrance foreign organisms more difficult.

[fol. 351] Mr. Morton: I offer in evidence a copy of the U. S. Patent No. 199,209, January 15, 1878.

(Received in evidence and marked "Defendant's Exhibit No. 22.")

The next one is Patent No. 216,414, dated June 10, 1879, patented in Germany, July 31, 1877, issued to Hugo Jannasch, and covers an antiseptic compound by which fruit meats of all kinds, milk, butter, eggs, skin, fish, fruit and vegetables, may be preserved and the compound is to be used either as a salt, that is to say, dry, or in a more or less

strong solution, according to the time for which this article is to be preserved, by a combination of sugar and salt.

The purpose of this patent is in the main to put boracic acid into more soluble form. A good many of these combinations are designed to put boracic acid in more soluble form. The combination consists of hyponitrate of potash, hypochlorate of soda, borate of soda, borate of potash, and free boracic acid, which is made by the action of chloride of potassium and nitrate of soda which is saltpetre and boric acid to one another. The product it is claimed is more soluble.

Mr. Morton: I offer in evidence copy of the Patent No. 216,414, dated June 10, 1879.

(Received in evidence and marked "Defendant's Exhibit No. 23.")

The next Patent No. 221,541, dated November 11, 1879, issued to Lorenzo Fagersten, is for the purpose of preventing mold upon meats and consists in taking and dipping preserved meats, pickled meats, apparently in a hot solution of boric acid or its salts. He states, lower part of the second column:

"I do not claim, broadly, the use of boracic acid or its salts, as I am aware they have been used in a powdered [fol. 352] condition and in a cold solution, but am not aware that a hot solution of boracic acid or its salts has been heretofore used for the purpose of preventing mold upon meats."

Mr. Morton: I offer in evidence a copy of U. S. Patent No. 221,541, dated November 11, 1879.

(Received in evidence and marked "Defendant's Exhibit No. 24.")

The next patent, No. 234,567, dated November 16, 1880, issued to Julius Hauff, is for a dry preserving compound and is based, as the patent states, upon the antiseptic or preserving qualities of boric acid and of borax, which it says are well known.

It must be one of those patents which it is designed to make boric acid or borax more soluble, and put in a form which will more thoroughly wet a greasy material, because

naturally, unless the object is wet that substance in solution cannot act on it.

Mr. Morton: I offer in evidence copy of U. S. Letters Patent No. 234,567, dated November 16, 1880.

(Received in evidence and marked "Defendant's Exhibit No. 25.")

The next one is Patent No. 268,094, dated November 28, 1882, issued to William F. Grier, and is for a combination of boric acid and borax. It apparently is also one of these patents which is designed to produce a more soluble form of the preservative and it mentions its use for a considerable number of organic substances and specifically it mentions its use to prevent the mold and mildew in tobacco manufacture; in other words, it deals with the prevention of mold.

Mr. Morton: I offer in evidence a copy of U. S. Patent No. 268,094, dated November 28, 1882.

[fol. 353] (Received in evidence and marked "Defendant's Exhibit No. 26.")

The next patent is Patent No. 270,889, dated January 23, 1883, issued to Ransom F. Humiston, and is for a mixture consisting of borax, sulphite of calcium or its equivalent in the form of bisulphite of calcium, salt and glucose in certain specified proportions. This patent contains a reference to the preservative qualities of boracic acid at the bottom of the first column, line 25. "The boracic acid of which the borax is mainly composed is a known and exceedingly effective antiseptic and preservative."

Mr. Morton: I offer in evidence a copy of U. S. Letters Patent No. 270,899, dated January 23, 1883.

(Received in evidence and marked "Defendant's Exhibit No. 27.")

The next one is Patent No. 281,544, dated July 17, 1883, issued to Carl Maria Pielsticker and is for a new antiseptic consisting of twenty parts of boracic acid, eight parts of phosphate of soda and two quarts of formiate of soda. Apparently, also, one of those attempts to put boric acid into more soluble form.

It carries the statement: "Many processes have been tried to preserve alimentary substances unaltered in a raw and uncooked state, as, for instance; raw meat and fish, by means of various antiseptics, but only with partial success."

In addition to the use of antiseptic, the patentee uses a method for getting rid of the air or putting the material into a close chamber and passing carbon dioxide under pressure through it. In those days not much was known about putrefaction as it is today and it was supposed that air was a necessary part. We know today that air is necessary because the germs get on the putrefied material [fol. 354] through the air and that the air in itself is not a puterfying agent. That was known in those days.

Mr. Morton: I offer in evidence U. S. Letters Patent 281,544, dated July 17, 1883.

(Received in evidence and marked "Defendant's Exhibit No. 28.")

By Mr. Morton:

Referring again to this last patent I note this statement:

"I am well aware that boracic acid has been used in almost every conceivable form as an antiseptic, but, as far as I have been able to find out, never in combination or as a compound with phosphate of soda and formiate of soda, both of which I find to be essential to produce the effects which I desire and have described."

The next patent is No. 556,471, dated March 17, 1896, and issued to Augustus Morris and James Augustus Parker. It is designed for the preservation of fruits, vegetables, meats and so forth, cheese, eggs and mentions these things specifically, cheese, eggs, confectionery, vegetable and animal matter, ham and bacon.

It consists in first treating the object with a solution containing in an English gallon ten ounces of gelatine, ten ounces dextrine, two and one-half ounces borax, two drops of glycerine to each fluid ounce of the solution, and two and one-half ounces pure spirits wine, by which, of course, is meant ordinary alcohol.

The material is dipped in this solution and directions are given for its preparation and then the article is allowed to dry and it is particularly recommended for the treatment and preservation of fruits, having smooth skins and especially for the preservation of grapes. That is in the middle of the second column of the first page.

[fol. 355] Mr. Morton: I offer in evidence copy of patent 556,471, dated March 17, 1896.

(Received in evidence and marked "Defendant's Exhibit No. 29.")

The next Patent No. 694,301, dated February 25, 1902, and issued to Adriaan Louis DeSturler, and is designed for the preservation and claims the preservation of vegetables, fruit, meat, eggs and other perishable substances. The invention consists or at least the statement is made that the surface is first sterilized with some sterilizing agent or medium. The substances used, as examples of sterilizing agents, are sulfurous acid, formic aldehyde, or boracic acid. Then the article is to be wrapped airtight in material which has been impregnated with an antiseptic substance and it is then coated with a heavy hydrocarbon such as paraffin or mineral grease or wax or spermaceti.

Mr. Morton: I offer in evidence the copy of Patent 694,301, dated February 25, 1902.

(Received in evidence and marked "Defendant's Exhibit No. 30.")

The next is Patent No. 1,245,380, dated November 6, 1917, and issued to Thomas J. Peters, and describes a layout of machinery for the treatment of vegetables and fruit, particularly mentioning tomatoes. And the machinery is designed to give the tomatoes a bath, to use the language of the patent in the lower part of column 1 of page 2 of the patent, to give the tomatoes a bath in a fluid containing disease-destroying properties which will kill fungus, bacteria and other germs and matter which would in the ordinary course develop decay and rot in tomatoes during shipment.

[fol. 356] The only fungicide or antiseptic mentioned is Bordeaux mixture. Bordeaux mixture is a mixture of

copper sulphate or bluestone treated with lime. It is a well-known spray.

I would like to add one word. The disease-destroying bath is given as in a separate tank from the washing tank.

Mr. Morton: I offer in evidence copy of the Peters Patent No. 1,245,380, dated November 6, 1917.

(Received in evidence and marked "Defendant's Exhibit No. 31.")

The next patent is No. 1,400,086, dated December 13, 1921, and issued to Rex De Ore McDill. It mentions specifically that it is for the purpose of preserving fruit and relates particularly to treating raw citrus fruits with a coating which is impervious to moisture emanating from within the fruit and so on and air from without, thereby preventing shrinkage and arresting decay.

The treatment consists in scrubbing the fruit according to the usual practice with a solution which contains formaldehyde, if a disinfectant is used, formaldehyde being formaline and a power disinfectant.

It provides for fumigation, if that is necessary and the sterilized fumigated fruit is then coated with a covering of paraffin thinned with a petroleum or it says bathed in beta-naphthol which is a coal-tar product which may also be used.

Mr. Morton: I offer in evidence a copy of Patent No. 1,400,086, dated December 13, 1921.

(Received in evidence and marked "Defendant's Exhibit No. 32.")

[fol. 357] The first of the British Patents is No. 1893, issued to Martin Olsson, dated June 21, 1869, and is a communication from Henrik Gahn and Elof Esaias Edgvish. It is obviously the same invention which was patented by Gahn in Gahn's name in the United States. It is somewhat more detailed.

It is for the purpose of preserving animal and vegetable matter by boracic acid and it mentions specifically meat and game, eggs and poultry, milk and fish, beer, wine, butter, vegetables, oysters, lobsters, fruit, melons and pine-apples. The method of application consists in dissolving

in warm water six and a half ounces to the gallon. The article is then soaked and then dried or it is packed directly in the powder. The patent gives detailed directions and contains a reference to the use of alum.

Page 6, at the top. He says:

"When required to be kept only for two or three days it should be gutted and then dipped (but not left immersed) once or twice in the solution, or occasionally sprinkled with the same. To preserve it for some time the dry acid may be by preference, used mixed with alum and sugar in the proportion of two pounds of acid to one pound of alum and two pounds of sugar."

Then, on page 5, he says:

"When it is required to keep meat for any length of time, for instance, in order to import it from remote countries, or to provision ships for long voyages, the acid must be applied dry in the same way as salt, and used thus alone in sufficient quantity it effectively prevents putrefaction for almost any length of time. It has, however, a tendency gradually to dissolve the membranes forming glue,"—that was the phenomenon I referred to a little while ago—"which in the course of a few weeks begins to affect the taste of the meat unless some admixture is used for counteracting this effect. Of different substances that have [fol. 358] been tried for that purpose pulverized salt or alum appear to be the most advantageous, a mixture of one pound of the latter with two pounds of the acid, having in particular shown satisfactory results; three pounds of this mixture are sufficient to preserve 100 pounds of meat, and it may be applied in the following manner."

He therefore put in the alum for the purpose of counteracting the secondary effects.

Mr. Morton: I offer in evidence a copy of the British Patent 1893, dated June 21, 1869.

(Received in evidence and marked "Defendant's Exhibit No. 33.")

The next one is dated June 16, 1880, No. 2438, and is issued to Thomas Foster Wilkins. It relates to the preser-

vation of shellfish and eggs and may be used in the preservation of other articles also.

It consists of immersion in an antiseptic bath and then this bath consists of a solution of one or more of the following substances—either alone or in combination—potassic chloride, sodic chloride, boracic acid, glacial methaphosphoric acid, salicylic acid, salicin, biborate of soda, the alums, and sugar, the alums being a general name for the different salts of aluminium and sulphuric acid, and then covering with a special kind of paraffin.

Mr. Morton: I offer in evidence a copy of British Patent No. 2438, of 1880.

(Received in evidence and marked "Defendant's Exhibit No. 34.")

The next one is British Patent No. 4910, dated November 25, 1880, issued to Gerard Wenzeslaus von Nawrocki, communication by Otto Leupold of Germany.

[fol. 359] It begins with the statement that boracic acid is the most effective antiseptic for the preservation of meat and other articles of food, but its application to such purposes in the pure state is impracticable on account of its more or less insoluble nature and then gives a method for combining boracic acid so that it will be more soluble.

Mr. Morton: I offer in evidence copy of British Patent No. 4910 of 1880.

(Received in evidence and marked "Defendant's Exhibit No. 35.")

The next patent is 140, dated January 12, 1881, issued to Thomas Foster Wilkins and relates to the preservation of such foodstuffs as meat, fish, shellfish, eggs and certain vegetables by treating them with an antiseptic or combination of antiseptics and then coating them with a hydrocarbon. The antiseptics he uses are potassic acid, glacial metaphosphoric acid, alum, sugar, or the borates and biborates of acids, and carbonates.

Mr. Morton: I offer in evidence copy of British Patent No. 140 of 1881.

(Received in evidence and marked "Defendant's Exhibit No. 36.")

The next is British Patent No. 1332, dated March 25, 1881, and issued to Frederick Settle Barff. There is another one of those patents to put boric acid into soluble form and patents a process of making a compound, a chemical compound of boric acid with glycerine, a compound which is now generally widely used with the label "Boro-Glyceride."

Mr. Morton: I offer in evidence copy of British Patent No. 1332 of 1881.

(Received in evidence and marked "Defendant's Exhibit No. 37.")

[fol. 360] The next is No. 3823, dated September 2d, 1881. It is issued to Jasper Wetter. It deals primarily with eggs. It claims to destroy or neutralize, in the language of the patent:

"The minute organic germs which have penetrated through the shell."

It prevents the further intrusion of these germs from the surrounding air. It accomplishes this object by treatment with a solution of boric acid and water. It then coats eggs with a mixture of water, glass and chalk and thereby prevents the entrance into the eggs of any other organisms from the outside thereafter.

Mr. Morton: I offer in evidence a copy of British Patent No. 3823 of 1881.

(Received in evidence and marked "Defendant's Exhibit No. 38.")

The next is British Patent No. 6134, dated December 23, 1882, issued to Joseph Townsend, and relates to a mixture of boric acid and other salts which would make boric acid a radical more soluble, the boric acid more soluble. It is in line with some of these other patents and mentions specifically that it is useful in the preservation of fowls, beef, mutton, lamb, veal, meat, fish, eggs, milk, cream, butter and vegetables. The method of applying is to dry the surface

dipped up by the solution and then to force the solution into the article by a vacuum, and then to pack the article in cotton or cloth saturated with the solution, or with powder and dried—or with powder dusted into it. In the case of eggs he adds magnesium chloride, which is a salt that attracts moisture from the air, in order that the coating from borax which is given the eggs may be kept moist and not flake off.

[fol. 361] Mr. Morton: I offer in evidence copy of British Patent No. 6134 of 1882.

(Received in evidence and marked "Defendant's Exhibit No. 39.")

The next is British Patent No. 214, dated January 5, 1888, issued to John Storer. It mentions specifically the preservation of fruit and the prevention of decay, designed to be used for all kinds of fresh fruit. He accomplishes this end by proposing to pack the fruit in acids or chaff or green husks of fine shavings, which are soaked with a weak solution of boracic acid or alkaline borax, or biborax, thereby giving them antiseptic qualities, and then drying and packing the article in this material. The drying is done at 212.

It mentions specially apples, pears, oranges, lemons, limes, passion fruit. It mentions that a further protection may be given to these articles by wrapping each fruit in paper that has been impregnated with boric acid and dried. Apparently when this is done, this filling packing material was not supposed to be used. In other words, it is an alternative method.

Mr. Morton: I offer in evidence a copy of British Patent No. 214 of 1888.

(Received in evidence and marked "Defendant's Exhibit No. 40.")

No. 9145, 1893, is the next one, issued to Ludwig Hausler. It mentions specifically poultry, fish, meat, fruit, vegetables. He uses what is essentially a combination of glycerine and borax, or boric acid, boro-glycerine. His procedure is to dip in solutions of gelatine and boro-glycerine, one part of boro-glycerine in from 1 to 20 parts of water, and also he

uses gelatine, as I recall it. Yes, also he uses gelatine so as to make a coating.

[fol. 362] Mr. Morton: I offer in evidence a copy of British Patent No. 9145 of 1893.

(Received in evidence and marked "Defendant's Exhibit No. 41.")

The next is a British Patent No. 25,512, issued or "accepted" as it is put here, November 7, 1907; issued to Edmund Harvey. This is a patent dealing with the re-processing of dried fruit which has gone out of condition, and consists in the treatment with a hot antiseptic solution. A number of antiseptics are mentioned, among which is boric acid. As the solution would be alkaline, that is, contains an alkaline, it causes boric acid to be present in solution as borax or another salt.

Mr. Morton: I offer in evidence a copy of British Patent No. 25,512, of 1906.

(Received in evidence and marked "Defendant's Exhibit No. 42.")

Speaking of antiseptics in general, the more concentrated the antiseptic, the more rapid its killing action, so that one might say, for strong antiseptics the action is proportional, roughly, to the concentration, until you get to the limit which rapidly kills all of them, if they are once dead, of course—you get to that limit—you have no way of measuring, but if it is a case of a weak antiseptic like boric acid, the effect is rather an inhibiting effect than actual destruction of the vitability of the organs. The difference in concentration would be more pronounced up to a certain limit in the case of boric acid, than in the case of bichloride of mercury, which is so very powerful.

The action is affected by the duration of contact, that is, the time of soaking in this way: The longer the contact the greater amount of boric acid that would act or be absorbed by the organism on which it acts; so that within the [fol. 363] limits I have indicated, the longer the action of the antiseptic, the more the inhibiting effect or its destructive effect.

The chemical action that takes place in the softening of water with ordinary softening agents is this: Ordinary hard water is hard because it contains salts, soluble salts of mainly lime and magnesium. When you want to wash in such water with soap, you get a soap that is hard soap. Soap is a sodium salt of the fatty acid, and when that sodium salt of the fatty acid dissolves in the water, then there is a rearrangement and you get lime salt substituted for the sodium salt. So that you have got the lime salt of the fatty acid, or the magnesium salt of the fatty acid instead of the sodium salt, and that lime salt and that magnesium salt are insoluble and therefore have no detergent action, being insoluble, so you cannot get a lather with a hard water until you have added enough soap to it to have neutralized or taken up all the lime and magnesium, or nearly all in the water, and then you get your sodium soap in the water and that makes your lather.

Now, when you soften a water, the softening of water is done by removing the lime or magnesium from solution in the water, usually by substituting sodium for the lime or magnesium, so that you get a lather with less soap. That is essentially—of course, there are many ways of getting rid of that lime and magnesium, but the commonest way is substituting sodium for it.

I am familiar with the composition of ordinary washing powders such as Gold Dust and the like. Gold Dust is made by taking cotton oil foots. Cotton oil is a dark black nasty oil when it is crushed from the seed. It is refined. The process of refining consists in treating it with hot caustic soda which takes the free fatty acid which may be present in the cottonseed oil and converts that into a soda soap that is insoluble in the oil and settles out and that is known as [fol. 364] cotton oil foots in the trade, and from that Gold Dust Powder is made by adding soda ash, which is sodium carbonate, carbonate of soda freed of its crystallization; and Gold Dust washing powder was originally invented for the purpose of getting a better market for its foots, which could not well be marketed, and especially the washing powders are made from those obtained from refinding different kinds of oils by and with a lot of soda, 40 per cent. of soda perhaps, of soda ash.

Since washing powders contains a large amount of soda, they will of course tend to make it easier to form a lather in water. They do soften water. As between borax or Gold Dust I should say Gold Dust would be the better water-softening agent.

It would be a very uneconomical thing to use both borax and Gold Dust for the purpose of water-softening at the same time, the Gold Dust being much more effective than borax, and ordinarily—I do not know but I imagine cheaper.

Referring to the Horticulturalist Rule Book published in 1898, I find reference to boric acid on page 187, under the heading "Preserving Fruits for Exhibition," where there are directions for preparing various solutions in which fruit may be placed in order to preserve it for exhibition purposes. Among those solutions is one, paragraph 4 of this chapter. The directions read as follows:

"Boric acid may be used as a preservative by dissolving half a pound in 50 pints of water if the liquid is not clear filtered useful for colored fruits."

In using a preparation of that kind, the fruit is ordinarily submerged in the liquid. Every one has seen them in country fairs and other places. The fruit is put in a fancy bottle, and the bottle is filled with preserving liquid.

[fol. 365] Mr. Morton: I offer in evidence the title page and ~~page~~ 186, 187 of the Horticulturalist Rule Book issued in the year 1898.

(Received in evidence and marked "Defendant's Exhibit No. 43.")

Cigars are not regarded as a food or drug in interpreting the Pure Food and Drug Act. Foods and drugs are defined for the purposes of the act. The definition is such that there is not any question that tobacco is not for the purposes of the act, either a food or drug and has never been so regarded by the Department of Agriculture.

Cross-examination.

By Mr. Neave:

XQ. 56. Doctor, what experience have you had in the citrus industry?

A. Only such experience as came to me in connection with the enforcement of the food law.

X Q. 57. And what was that experience that you had in connection with that?

A. That experience came in connection with passing on cases dealing with alleged or actual violations of the law in the interstate shipment of citrus fruits and in the fact that in connection wi-h my official duties I had to inform myself concerning the method of handling and packing fruit. I did that specifically in the year 1915, when I went to in connection wi-h my official duties I had to inform myself concerning the use of the fumes of burning sulphur on dried fruit, and one for the purpose of informing myself concerning the packing of citrus fruits. I did that on the visit with Mr. Powell, who was then in Los Angeles, whom I knew very well. On his invitation he drove me around through some of the more important packing houses in the southern part of the State of California, and I saw the [fol. 366] methods of operation at that time. I have not been in a packing house so far as I know since then.

X Q. 58. What packing houses did you go to at that time, Doctor?

A. I do not remember their names. I think I was at the San Dimas house, which I believe is a lemon house if I remember correctly, I think I was at the house at Riverside and some others.

X Q. 59. And the Rialto Heights Association house?

A. I am quite sure that I was not in the Rialto Heights Association. I have no recollection of it. It has been a long time ago, and I do not remember what houses I was in.

X Q. 60. And did you observe their methods of packing and handling fruit?

A. I did at that time, yes.

X Q. 61. And washing it and so forth?

A. Well, I do not remember very closely just what they were doing. It is eleven years ago and I have had a good many other things to do since then.

X Q. 62. And do you recall that fruit, that is, how they were using the chemicals in the water?

A. I do not remember anything about their manner of washing.

XQ. 63. Have you had anything to do with the preparation of fresh fruit for the market?

A. Personally?

XQ. 64. Yes.

A. Only in the same way that I had to do with the citrus industry. We had cases against shippers of apples and pears and other articles of that kind. Personally, I have never shipped anything.

XQ. 65. What were those cases, against packers of apples and pears, and what kind of things came to your attention in that connection?

[fol. 367] A. What kind of things? We had to make about 2500 cases under the Food Law a year, and—I have to think a moment. We had shipments, I think, cases against shippers of apples, for shipping apples. They were using the term under the law, "decomposed" and "wormy" misbranded in one way or another, and we also had up, just before I left the bureau, the question of spray residue on apples, I think it was.

XQ. 66. Have you had any experience with the relative actions of borax and boracic acid as a preventative of blue mold decay on citrus fruits?

A. You mean have I personally made any experiments—no.

XQ. 67. You have not made or observed any tests in that connection?

A. Not that I personally know.

XQ. 68. Are you familiar with the article by Fulton and Bowman, which is Plaintiff's Exhibit No. 44?

A. I think I read that a day or two ago.

XQ. 69. And on page 962 of the copy of the article that is in evidence, there is a table showing the results of treatment of oranges with 5 per cent. boric acid and 5 per cent. sodium borate, and the results show the amount of decay that was observed in each of those treatments, and you found there, did you not, that the boric acid treatment was not nearly so effective as the borax treatment?

A. In this particular table, that is true.

XQ. 70. Do you know of any tests to the contrary?

A. The oranges, no, but there are plenty of tests under other conditions to the contrary.

X Q. 71. Well, on other occasions, you mean with other fruits?

A. I do not know of any experiments with fruits. I mean that the relative antiseptic action of borax and boracic acid, as against a variety of organisms has been tried, and perfectly reliable people, for instance, Koch, the great bacteri- [fol. 368] ologist, reports results to the contrary to those, not using fruits and working on different organisms.

X Q. 72. Have you tried the processes described in the various patents and publications to which you have referred?

A. No.

X Q. 73. What are the technical names of blue mold and the green mold?

A. Penicillium—what do you mean—there are so many of them?

X Q. 74. What kind of penicillium is blue mold?

A. It may be any one of a considerable number of species. There is not any one species of penicillium which is the only blue mold. There are a considerable number of species. I could not mention them all.

X Q. 75. The publcations that I have seen that are in evidence here——

A. You are talking about citrus, the one that is commonest to citrus.

X Q. 76. Yes.

A. That is penicillium italicum.

X Q. 77. Italicum, and the other?

A. Italicum, and the green or blue one that is commonest penicillium digitatum.

X Q. 78. What is penicillium glaucum?

A. Penicillium glaucum is a name that was given by the first man who segregated this genus or other germs. In 1809 he gave this name penicillium glaucum to a formation he described in those days, but no one knows just what form it was, because his description was inadequate.

X Q. 79. Are any of the various penicillia or penicillium that are mentioned on page 4 of the publication that Mr. Morton put in evidence this morning entitled "Some experiments with boric acid canning powder," the penicillium [fol. 369] that occur in the mold of fresh citrus fruits?

A. None of those, as I recall them, Mr. Neave, are those that commonly occur in the blue-mold. Penicillium italicum and penicillium digitatum, which are the commonest ones of citrus fruits, are not mentioned in that way.

XQ. 80. Formate of soda is a much stronger preservative or inhibitive thing than boracic acid, is it not?

A. I think so.

XQ. 81. What is hypochlorate of soda; is there any such thing?

A. No. I do not know what the man in that patent had in mind when he mentioned hypochlorate of soda.

XQ. 83. Hypochlorate of soda?

A. Yes.

XQ. 84. And that is a preservative agent, stronger than borate of soda, is it not?

A. It depends on circumstances, on other organic matter. Hydrochlorite of soda or lime acts by oxidizing organic matter. If there is present a great deal of organic matter, it takes that organic matter, all of it, and there may be not enough left for the antiseptic action. It depends entirely on circumstances. It may or may not be stronger. It depends on the concentration and the amount of organic matter that is there.

XQ. 85. In some of the patents to which you have referred, such as the DeSturler United States Patent No. 694,301, and the Hausler British Patent No. 9145 of 1893, provision is made for coating the article with a heavy hydrocarbon?

A. Is that in both those patents?

XQ. 86. No. I am reading from one. And the other provides for a heavy hydrocarbon whereby the food is effectively sealed from the atmosphere as expressed in the DeSturler patent, and coating the article with a gelatinous matter, so that the article will be completely covered by [fol. 370] the substance as expressed in the Hausler patent. Have you had any experience with citrus fruits so treated?

A. No, sir.

XQ. 86a. And do you know what would happen to the citrus fruits so treated?

A. I can infer what might happen from general knowledge of other things.

X Q. 87. And what do you think would happen?
A. I think that it would depend on the temperature.

The Court: On what?

A. On the temperature, but essentially what would be likely to happen in the long run, and I would not venture to say whether that was a week or two, or any length of time, without performing experiments, but that would be a self-digestion of the inside of the fruit, assuming that the process had sterilized the fruits and prevented the entrance of germs, assuming that the claims of the patent are correct, I do not know that that would be. Assuming that germs could not get in and they were eliminated, you would have in time some beginning of the breakdown of the cells inside the orange in this case, releasing the ferments which are the tools with which the cell carries on its own work, its life work. It would begin to gradually soften, it would have a self-digesting cell. I have no idea under these circumstances how long that would take. My guess would be that it would take place much more rapidly in the case of the paraffin coating than in the case of the gelatine coating, and for this reason, that these processes of death, that is what the breakdown is of the cell, will be accelerated by the piling up of the products of cell life within the cell, failure to eliminate as in Bright's Disease, making a rough comparison with higher animals, and therefore a coating which [fol. 371] made it difficult for the gaseous products of cell life to pass to the exterior would affect the result that I have in mind, and much earlier than one which did not so obstruct their passage out. Now, the main ones of the products of this cell life are carbondioxide and water and no doubt others. We know for instance that the apple gives out acid aldehyde, which is a substance intermediate between alcohol and vinegar. No one has investigated, and I do not know whether that is true of the orange, but these substances happen to be soluble in carbon dioxide in water, and are not soluble in oils. They are an oily coating—I am spinning an hypothesis, your Honor, I have not experimental proof of this—an oily coating would tend to prevent the passage of such substances which were not soluble in oil to the exterior much more effectively than a coating in

which they were soluble. Now, gelatine would be more or less dry. If it were not very dry, if it were in a moist atmosphere, it would contain a water content which might run from 10 to 15 per cent or thereabouts. Gelatine is extremely hydroscopic. The presence in that water—and again speculating on all I know about the behavior of the membranes—would permit the passage to some extent, again I can not tell you how much, not having tried it, of carbon dioxide in water which is soluble in water through the gelatine which contains it. Now, it is considered a matter of quantity, I do not know how long or how much or how long it would take, and what the difference between the two would be. That is all a matter for scientific investigation.

XQ. 88. If I may attempt to put it in less scientific language——

A. Yes, sir.

XQ. 89. As I understand it, a citrus fruit should be allowed to breathe?

[fol. 372] A. Yes, sir.

XQ. 90. And that means that it should be allowed to give off gases as they are formed inside, and perhaps would be allowed to take in air and I do not know whether it breathes in both directions or not?

A. For plants that is less important.

XQ. 91. And that if you do not get this breathing then you get this action going on inside which may be spoken of, which I suppose means that you have internal decay, does it not?

A. I should not call it decay, Mr. Neave.

XQ. 92. It spoils the orange. You do not want to eat it after that?

A. It would. Scientifically speaking decay is the result of the action of micro-organisms.

XQ. 93. I was not speaking scientifically, I realize. It spoils the orange, does it not?

A. It spoils the orange, but you see you hang game and eat it and it is not decayed and it is the same action, this same self-digesting in hung game and it is the same post-vital process.

XQ. 94. We do not like hung oranges, do we? I understood you to say in testifying about Patent No. 1,400,086 to

McDill, that the fruit was scrubbed in the disinfectant solution, did I understand you rightly, or did I misunderstand you?

A. I do not rememmber. I was going through this patent hastily. I may have made a mistake.

X Q. 95. I think it was not scrubbed.

A. That was my mistake. The fruit is scrubbed by the ordinary method and then goes on.

X Q. 96. Now, with such things as eggs, in order to preserve them, we do want hermetic sealing, don't we?

A. Well, as a matter of experiment, I do not know whether eggs keep better that way or not.

[fol. 373] X Q. 97. Well, when you put eggs in waterglass or coat them with waterglass, that is the result you get, is it not?

A. But nobody would compare an egg preserved in waterglass with an egg preserved by keeping it at a low temperature. Waterglass eggs are not a commercial article. That is a make-shift done in the household by women, and the commercial article is the egg preserved in cold storage, and I do not believe anybody would compare an ordinary waterglass egg with the cold storage eggs. These patents go back to the time before cold storage was developed. May I add one other thing there? Conditions in eggs are a little different from an orange. An orange consists of tens of thousands, perhaps millions of individual cells. It is a colony, a population of cells. An egg is a single cell. The respiration that takes place in an egg is infinitely small before it begins to divide and develop, as compared with the respiration of a multitude of cells in an orange, and the best eggs are eggs that are not fertilized, so that they have not the power of growing. The respiration there is very small, and you can not compare an egg with an orange.

X Q. 98. You have used the word "antiseptic", I believe. What is your definition of the word?

A. Antiseptic or aseptic?

X Q. 99. "Antiseptic"?

A. Antiseptic, I should say antiseptic, when you speak of a substance as being antiseptic, that it has the power of either destroying or preventing the development of microorganisms.

X Q. 100. Are borax and boracic acid antiseptics?

A. Borax and boracic acid are antiseptic to the extent that they prevent the development of many forms of microorganisms. They are not very effective in destroying them.

[fol. 374] X Q. 101. You spoke a moment ago of the effect on oranges of hermetically sealing the outside so that the orange can not breathe, and you said in a greater or less length of time, you could not say which, some of this internal action would go on. That would spoil the orange so far as eating it is concerned, I suppose, in the stages of that action taking place, the orange gets less and less eatable; it does not taste as good?

A. I suppose that is true, but I have never tried it.

X Q. 102. You spoke, I think, of Koch's observation on the effect of boric acid and borax?

A. Yes.

X Q. 103. Now, those observations were with respect to bacteria, were they not; not with reference to the molds?

A. They were.

X Q. 104. In the softening of water by adding borax to it, what happens chemically?

A. Well, you probably get the formation of some calcium and magnesium borate.

X Q. 105. You mean the borax unites with those chemicals in the water that make the water hard?

A. No, no. It combines with some of the ingredients.

X Q. 106. And forms what?

A. And forms insoluble compounds; takes the thing out of solution so that it protects the soap, to some extent, from the attack by the compounds in the water.

X Q. 107. That is, the borax unites with some of those ingredients in the hard water to form insoluble compounds. Then what?

A. Less soluble compounds.

X Q. 108. Less soluble compounds. Then what becomes of those less soluble compounds?

A. Well, they remain in the system.

[fol. 375] X Q. 109. Do they precipitate?

A. That would depend upon the proportions with which you are dealing. I cannot tell you. It would depend upon how much of the substances which give the water its hardness are present. I do not know. It depends how much

borax you add; and upon any given set of circumstances.

X Q. 110. That is, the extent to which you have borax and the extent to which you have substances which make the water hard?

A. Yes.

X Q. 111. The borax will unite with those substances and make it soft?

A. Whenever you get a series of different substances, salts in any one system, there is a readjustment, an exchange of particles, if you want to call it that, between the various elements and the various acids until you get a new equilibrium of the acid which is dependent upon the relative strength of the acid and the different substances there. That happens when you put borax or any other substance in it.

X Q. 112. Give me the names, I have forgotten them, of these things which are in the water that make it hard.

A. Calcium—it may be calcium sulphate, mostly calcium and magnesium sulphates, some carbonates.

X Q. 113. Well, take calcium sulphate, for instance, being present in water and you add some borax; those two unite in some way, do they?

A. You will get a rearrangement by which you will get—if you add only calcium sulphate you will get calcium borate or magnesium sulphate. There will be some interchange between the basis and the acids there, some rearrangement depending on the conditions.

[fol. 376] X Q. 114. And these new things that form as a result of these rearrangements, such as calcium sulphate or calcium borate, are they antiseptics?

A. If you get calcium borate—I do not know of any experiments on the antiseptic action, I am again giving you merely my opinion concerning the probable action. Inasmuch as calcium borate is a pretty insoluble substance, which is one of the forms in which borax occurs and is an insoluble mineral, the borax mineral, and colemanite is a borax mineral, it is a very insoluble substance, and I imagine the antiseptic action of such substance would be very much less than that of a soluble substance, such as calcium borate, if that is what you are driving at.

X Q. 115. That is what I mean.

A. Quite so.

X Q. 116. That is, the compounds do form there?

A. They do; quite so.

X Q. 117. Would probably be less——

A. Would probably be less antiseptic, though I know again of no experimental work that has been done.

X Q. 118. The Department of Agriculture advises the use, and as for a good while advised the use, of arsenical sprays on fruits, such as apples, pears and so forth, has it not?

A. Yes, the Bureau of Plant Industry and the Bureau of Entomology have so advised.

X Q. 119. Have you kept in touch with the citrus industry sufficiently to know what effect the use of borax in the treatment of the citrus fruits has been?

A. I did not know anything about the use of borax on citrus fruits until Mr. Morton got in touch with me in New York two or three weeks ago.

X Q. 120. Is boric acid less soluble or more soluble than borax?

A. I made some notes on that; may I use them?

[fol. 377] X Q. 121. Yes, certainly.

A. I simply have a table here on them. I do not carry those things in my mind.

X Q. 122. Go ahead.

A. Of course, the solubility of this substance varies with the temperature. I just took one off of my table here. At a temperature of 10 degrees Centrigrade, Sidell, who has published a standard dictionary of solubilities—I would not carry these things in my head, I have to go to the reference books to find them out—Sidell states that 10 degrees Centigrade, that the solubility of borax is 2.98 grams in 100 grams, that is to say, a saturated solution would contain 2.98 grams in 100 grams, at the same temperature, he gives for boric acid a solubility of 3.45. On the other hand, when you go to higher temperatures——

X Q. 123. Just what does that mean? Does that mean that at that temperature the boracic acid is more soluble or less soluble?

A. More soluble.

X Q. 124. More?

A. But if you go to higher temperatures, say, 20-21, or thereabouts, which is summer heat, then you will find that

the conditions are reversed. At 20 degrees, Sidell gives the solubility of boric acid as 4.8 per cent., and at 21½ — he does not give in his table the exact or same temperature. He gives the solubility of borax at 5.15, and as you go up the scale—up the temperature, you will find that the solubility of borax rises as you get—as it gets hotter and hotter, faster than the solubility of boric acid. Now, I have not determined those things myself. I got them from standard books.

X Q. 125. Are eggs coated with gelatine a commercial article, so far as you know?

A. No, sir, I do not know of any such thing.

[fol. 378] Plaintiff's Rebuttal Proofs

LEE B. SKINNER

LEE B. SKINNER, was recalled as a witness in rebuttal on behalf of the plaintiff, having been previously duly sworn, testified as follows:

Direct examination.

By Mr. Neave:

I knew Mr. F. S. Pond, of the Eustis Citrus Growers Association. I recognize this picture, on page 10 of Plaintiff's Exhibit 28, as Mr. Pond. I was once at Mr. Pond's packing house at Eustis. I was there at that barbecue or celebration that was mentioned. I was there one day.

I went to Eustis for the purpose of investigating the packing methods and especially with the object in view of finding out whether there was anything new. On that day I went through Mr. Pond's packing house. I went there with a number of other people. I did not see any chemicals of any kind being used in connection with the treatment of fruit there. I was not told anything about any use of borax or other chemicals.

I was specifically interested in methods of reducing or preventing decay, because not only was I a fruit grower and packer, but I had developed some machinery along

that line and the purpose of my visit was along that line. I had been in many ways a pioneer in the industry and I had one of the first machines, and I think I was the first that used the panel box and the first packer that used permanganate of potash in soaking tanks. My interest was to find out whether there was anything new in preventing decay or in handling of citrus fruits to advantage.

The talk concerning means of preventing decay as I remember it was entirely along lines of careful handling. As [fol. 379] Mr. Harris mentioned, every doubtful orange was a cull and it was emphasized, and every orange that was dropped any distance was thrown into the cull pile and Mr. F. S. Pond was there that day. I saw him that day and talked to him. I could not mention any specific instance that I talked with Mr. Pond at other times, but I frequently met Mr. Pond in Tampa.

I talked with him just as one orange grower would to another, or one orange packer to another. We were always exchanging ideas. He never mentioned borax to me in connection with fresh fruit or any other connection.

At the time I made this visit to Mr. Pond's packing house, I was particularly interested in washers. I had invented the Skinner washer, and I was interested in every kind of washer.

I did not have any deal on then with reference to washers especially. We had a deal on with a manufacturing company in California to buy their patents in connection with packing house machinery.

When I went through Mr. Pond's packing house that day, I saw a soaking tank and a washer, the Limoneira. The structure of that washer is shown in the Horrell and Bryant patent No. 941,993.

Mr. Neave: I offer that in evidence.

(Received in evidence and marked "Plaintiff's Exhibit No. 81.")

I would say that washer was ten and twelve feet long. There were pipes for spraying water on the washer; my recollection is that the pipes ran cross-wise. And there were sprays there from those pipes.

I had seen the Limoneira washer at California and in the Winter Park Packing House.

At that time in most districts of Florida the white fly, that is, the penicillium mold as a result of the white fly, [fol. 380] was very pronounced and very troublesome and it was absolutely necessary to use water in order to get rid of the mold as it was scrubbed off the fruit. If you did not get rid of it it would stay on the brushes and get right back on the fruit.

I might say in connection with that, that in the Skinner washer when we first started it, we put a spray for the first three or four feet—those rolls were twelve feet long, and we put a spray for the first three of four feet and the fruit came clear to the end of the washer.

When I was there at Mr. Pond's house at Eustis, I did not see any white deposit of any kmw on the soaking tank or on the washer or on the drier.

I am familiar with the Parker washer used at Tavares. It is a series of parallel brushes, spiral brushes, close to each other, and the fruit passes through two or three or four brushes, never less than two, and they revolve horizontally on a horizontal axis.

These spiral bristles that form the brushing surface stick out from the cylinder and they are cut in spiral form. I would say the cylinders were about ten feet long.

There were sometimes three cylinders, I don't remember exactly, but I don't think I ever saw one less than three, but there were sometimes more. They all lay side by side. And each cylinder rotated on its own axis. The bristles were spiral and the cylinders were slightly inclined. The Limoneira washer is level.

In the Limoneira washer these plates revolve around and the orange strikes that and gets over to the other side and the other side pushes it over again to the other side and it goes right through. The revolving plate does not throw the orange back toward the end at which it entered because the two guards are so arranged that the side that goes backward does not touch the orange. The guard does not [fol. 381] revilve at all. It is a side bar with bristles in it. Only about half of the revolving disc is in the pathway. The periphery outside is cut off. I think you will see it in the drawing.

All the Parker washers that I have ever seen had water sprayed on them.

Cross-examination.

By Mr. Morton:

I may have read this Patent 944,943 in time past, but if I have I have forgotten it. I do not know whether it contains any reference to putting water on the brushes.

I saw a number of those washers in California, and I think it was in 1909, I do not quite remember how many, but I have only seen two in Florida that I recollect, one at Winter Park and one at Eustis. I think there was also one at Winter Haven, but I am not positive about that.

My washer was on the market at that time.

Of the other washers which were on the market there was the Warner washer which had come and practically gone, although I think a few people were still using it and the Parker washer was on the market in California and there may have been in Florida at that time, but I do not remember them. It does not seem to me that I remember any others. That was at the very beginning—the white fly started in 1908-1909, in our district. It started in other districts before that time, I think, and it was the white fly that brought about the use of washers primarily.

The fruit was not washed at all before the advent of white fly, that is it was not the practice.

X Q. 57. There was a good deal of use of washing powder at that time, was there not?

A. Yes, I think there was washing powder and different things.

[fol. 382] X Q. 58. Was borax being used, too?

A. I understand so, yes, sir.

I was only one day at the Eustis house, that day of the demonstration. There was a barbecue that day.

I was not principally interested in the machinery in the house, I was as much interested in the result of the packing as I was in the machinery. The machinery business was more in charge of my son than in my charge, and I was interested in the fruit proposition as well as in the machinery. I was a grower and packer of fruit. I had heard that Eustis house was a very up-to-date house. I do not remember distinctly who showed me through the house.

X Q. 65. What else was being used in the soak tanks of various packing houses at that time? You mentioned wash-

ing powder and bluestone and permanganate of potash and borax. Do you remember anything else?

A. No, I do not think I do.

X Q. 66. Do you remember the work done by the Department of Agriculture in investigating the methods of handling fruit in Florida which has been designated as the careful-handling campaign?

A. Very well.

X Q. 67. Do you remember that the improvement brought about by that crusadte was quite considerable?

A. Very marked.

X Q. 68. You had at that time a high respect for the recommendations of the Department of Agriculture?

A. Very high.

X Q. 69. Did you attempt to use yourself everything that you might hear of some other man using?

A. I would not say that. I would not go as far as that, I said I was the first one to use permanganate of potash, [fol. 383] but that was recommended by the California Lemon Club.

X Q. 70. That was recommended for the brown rot of the lemon?

A. Yes.

X Q. 71. And you felt it might do some good for the blue rot of the orange?

A. I thought it might do good to sterilize the water.

X Q. 72. And that was really a Government recommendation which you were applying somewhat differently than recommended?

A. I do not think the Government ever recommended it. The California Lemon Club recommended it.

X Q. 73. It was published, I believe, in a bulletin of the California Department of Agriculture rather than the Federal Government. Do you remember seeing Mr. Harris at that barbecue?

A. No, sir.

Redirect examination.

By Mr. Neave:

R. D. Q. 74. Mr. Skinner, you have just spoken of your thought that permanganate of potash would sterilize the water. What was the thought in that?

A The thought was that the fruit might be contaminated with some of the decay in the water, and I wanted to do everything I could to prevent the decay, and that is why I used the permanganate

R. D. Q. 75. To sterilize the water so that it would not put bugs on the good oranges?

A. That is the point exactly.

R. D. Q. 76. Before 1923, or 1924, did you ever use any borax in connection with your citrus fruits?

A. Not that I recollect. I would not say that I did not use it as a washing substance but I don't remember.

[fol. 384] R. D. Q. 77. And prior to 1923 or 1924, did you ever actually know of anybody else using borax?

A. I do not really know whether I knew it or not. I do not recollect.

By the Court:

Q. 78. You mean for any purpose?

A. I mean in the washer itself. I have in mind some packages and I do not remember what they contained. I sometimes used them for cleaning purposes, but I do not know whether they were borax or just washing powder. I cannot recollect that.

By Mr. Neave:

R. D. Q. 79. Prior to 1923 or 1924, insofar as you had heard any suggestions as to the use of borax, what was the purpose for which the boxax was to be used?

A. Either for cleaning or softening the water.

R. D. Q. 80. And did any suggestion ever come to you that was useful for inhibiting blue mold?

A. Never, no, sir.

Mr. Neave: That is all.

Recross-examination.

By Mr. Morton:

R. X Q. 81. You knew, did you not, that boxar was a common preservative in those days?

A. Well, you asked me the other day about that—I think I recollect—I am confused in my mind as to whether I re-

member the campaign carried on by Dr. Wiley, whether it was benzoate acid or borax. I am a little bit confused in my mind as to whether I knew anything about it. I did not pay much attention to it anyway. I am a little bit uncertain in my mind as to how much I knew about borax being a preservative, or when you talk abouf preserving jams and things like that, I think I did know that somewhat.

[fol. 385] R. X Q. 82. Did you say that this bulletin No. 190, of the Agricultural Experiment Station, College of Agriculture, University of California, was the bulletin out of which you got the recommendation to use bluestone and permanganate of potash?

A. No, sir, that was a typewritten circular given to me by a friend of mine in California. I never saw that bulletin before.

R. X Q. 83. Do you remember any of the concentrations the circular recommended in the use of these chemicals?

A. No, sir, I do not right now.

R. X Q. 84. Can you name any one else who was using bluestone in Florida at that time?

A. No, sir.

R. X Q. 85. About that time?

A. The first time I ever heard of the use of bluestone in Florida was in the case of F. G. Sampson, who was packing lemons over at Sector Harbor, a nearby town to mine, and he had some terrible amounts of decay. He sent for Professor Rolfs of the Experiment—who was director—well, I do not know whether he was director at that time, but he was in the Experiment Station at Gainesville, in the University there; and Professor Rolfs came down and recommended to him that he use a low percentage of bluestone.

R. X Q. 86. That was quite a dilute solution, was it not?

A. Oh, yes, it must have been. It had to be.

R. X Q. 87. Where did you say you learned about permanganate of potash?

A. I learned that from this circular, from this typewritten circular that was given to me by a friend who got it from the California Lemon Growers.

R. X Q. 88. Did they recommend permanganate of potash and also bluestone?

[fol. 386] A. Also bluestone. Those are, I think, the only two things that it did recommend.

R. X Q. 89. Do you know of any one else in Florida who was using permanganate of potash in the treatment of oranges?

A. I do not, no.

R. X Q. 90. Do you know the name of any one who was using bluestone in the treatment of oranges?

A. I do not recall anybody except Mr.—I only recall Mr. Sampson.

X Q. 91. I thought you said it was lemons you treated?

A. It was lemons, yes. Oranges. No, I do not know that I know of any one.

R. X Q. 92. You knew, though, that others besides yourself were using those things, did you not?

A. Yes, sir, I presume so.

R. X Q. 93. But you do not recall the name now of anybody who was using them?

A. I do not recall. No, I could not give you the name of any others.

R. X Q. 94. Could you name anybody that was using any kind of preservative at that time?

A. I think maybe a good many of them were using it, but I could not name them particularly.

Allan H. McIntyre

Allan H. McIntyre was called as a witness in rebuttal on behalf of the plaintiffs and, having been duly sworn, testified as follows:

Direct examination.

By Mr. Neave:

I started my acquaintance with the citrus industry in California. I was manager of a house out there the last [fol. 387] few years that I was in California, the Lemon house of the Arling Heights Fruit Company at Riverside. I worked there from 1905 until 1913. I had charge of packing the lemons, yes, sir. I used chemicals in my wash water

there. We started in with permanganate of potash. Then we used a bluestone solution. These chemicals checked brown rot. They had no effect whatsoever so far as blue mold is concerned.

In 1913 we had a big freeze-out there and had to go elsewhere for employment and I went to Florida. I became connected with the Florida Citrus Exchange, first, as manager of the local association house at Ozona, Florida.

I next went back to California and I stayed there for a short time, I do not remember how long, but the manager of the sub-exchange in Florida induced me to go back there and manage the house one more year, and I did manage it part of that year.

I have been connected with the Skinner Manufacturing Company, and I am now connected with Virginia Skinner Patents, Incorporated. I make my headquarters at Winchester, Virginia, but the factory is at Cold Field, Virginia.

From 1914 until 1918 I was almost all the time in Florida. During that period I solicited business for the Skinner Machinery Company.

I had to get in touch with the packing houses in order to sell and take measurements, and so forth. I expect in the course of the time I was with the Skinner Machinery Company that I was in, I should say, well, 90 per cent. of the packing houses that were in existence at that time, possibly some very small houses I did not visit.

I knew Mr. F. S. Pond in Florida. I had known his family out in California. I paid Mr. Pond a visit at Eustis Pack-[fol. 388] ing House, of which he was manager, I think, in 1914 on two different occasions.

I do not remember how long he continued to be at that packing house in Eustis, but I rather think he took another position along about 1915 or early in 1916.

I saw Mr. Pond at other times in 1915 after he left the employ of that particular association and went as chief inspector for the Florida Citrus Exchange. I met him then a great many different times around in the hotels and at various packing houses throughout the State.

We were not working together on any work of any kind, but Mr. Pond would sometimes tell me where he thought they ought to have new machinery and to what extent the changes should be made and so forth, but we had no real

business relationship, except in a friendly way that he would put me next to prospects. We visited packing houses together at various times.

When I was at Mr. Pond's packing house at Eustis I did not see them washing and cleaning their fruit. I was not very close to the washing machine and I did not see them washing fruit. They did not happen to be running either time I was there.

Mr. Pond asked me what experience, if any, I had had with permanganate and blusetone in California. We discussed that at some length. He never told me anything about borax. I discussed decay with him many times.

In my experience washing powder was considered almost as necessary as the water itself to clean dirty fruit.

I knew Mr. G. Harold Powell out in California. Mr. Powell, with others, carried on some experiments in the packing house in which I worked and was manager of for some years.

In connection with my work in designing or installing machinery at these various packing houses in Florida, I think [fol. 389] I would know what, if any, chemicals the people were going to use. I believe a prospect would naturally want to know the effect of chemicals on the machinery, brushes and so forth, as the replacement of brushes is quite expensive. I think that would be a natural question.

I knew Mr. A. W. McKay, who was connected with the Department of Agriculture. I knew him when he was with the Department. That was in California. He was with Mr. Powell out there. Mr. McKay carried on experiments on lemons in my packing house out there in California. He and Powell were together working there, and Mr. Powell had charge. I became intimately acquainted with Mr. L. S. Tenny in Florida, but I think I met him in California; he was a Government man. I did not know him in Florida while he was doing any experimental work. He might have been doing experimental work, but I did not happen to meet him in any of the packing houses. I knew McKay in Florida, too, and was working with him there also.

During the off season—in those days during the packing season there wasn't any very great demand for machinery, and I went with Mr. McKay during the off season, as we call it, and was with Mr. McKay as inspector of the

Schrader packing house. Mr. McKay was, I believe, chief inspector for Schrader and I worked as his assistant. Inspecting included keeping the packs up to standard and trying to standardize packs and to—if one packing house manager would get onto a good idea of any kind, why, we would spread that news to the other packing houses throughout the State.

During all that time up to 1920 or later I did not know or hear of anybody in Florida using borax for any purpose. [fol. 390] While I was in Florida I had experience with oranges, and grapefruit, and tangerines.

If we suppose that the oranges and grapefruit are growing under the same conditions and picked under the same weather conditions, and so forth, of those two kinds of fruit, the orange is more liable to get blue mold decay.

When I went around these various packing houses with McKay or at Pond's house, or any house there, I did not see any white deposits on the drier or on the other parts of the machinery.

(Witness excused.)

Bronson C. Skinner

Bronson C. Skinner, was recalled in rebuttal, as a witness on behalf of the plaintiff, and having been previously duly sworn, testified as follows:

I knew Mr. F. S. Pond, of the Eustis Packing House. I was visiting his packing house at first at this barbecue, that Mr. Harris and my father talked of.

I went around the plant that day, and it was pretty generally inspected, but it was not in operation on account of the number of people visiting it, but it was ready to operate and was started up at intervals to show people the operation of the machine.

It was started up while I was there. I saw no chemicals put in the wash water; and while I was there, I did not hear anything about any chemical in the wash water. Mr. Pond was there at the time. I do not remember this Mr. Harris who testified that he was showing people around. I saw Mr. Pond at other times than that one visit, because Mr. Pond was quite active in the citrus industry in Florida for two or

three years after that, and of course I would meet him in [fol. 391] connection with my work in the packing houses, selling machinery and visiting packing houses.

During the two or three years after that barbecue, he continued to be with the Eustis house for a number of years and then he became inspector for the Citrus Association. He never told me anything about borax. I had never seen borax used in any connection in Florida prior to 1923 or 1924. I remember the type of washer there at Pond's house when I was there as the Limoneira. There was provision as to spraying water on the brushes.

I have been generally through the packing houses in Florida, I would say that I visited 95 per cent of the houses that are in existence in Florida.

The only washer that is used in Florida in which the brushes run in the water, in a tank of water, is the Nye washer. I will take that back. There was one other washer installed with a circular disc brush floating in water but that was only used a couple of years and taken out. All of the other washers keep the brushes clean by means of a spray of water coming down from above, running all the time. In the Nye washer, the brush dips into a tank of water and gets its rinsing effect in that manner.

In the tank of water in which the Nye brushes go, running fresh water is supplied. The stagnant water is thrown out in its operation.

At Mr. Pond's house there at Eustis, I saw Mr. Pond. He was quite active in showing people around. He had imported this outfit from California. This particular complete outfit of packing machinery was the first in Florida, and he took a great deal of pains to explain the operation of the various machines. I remember especially one machine that was very new in Florida, that is the weighing machine. I was right near Mr. Pond when he was explain- [fol. 392] ing this matter, and heard him talk.

My interest in the matter at that time was that I was manufacturing or had been manufacturing machinery as manager of the Skinner Machinery Company and we were considering the purchase of the Stebler patents and his machinery was Stebler machinery.

I am familiar with the original Skinner washer. For putting water on the brushes, it originally had only a four-

foot to six-foot length of pipe at the upper end of the brush, the idea being that by keeping the water off of the lower end, it would be more easy to dry the fruit because the fruit would not be so wet, but we found that an accumulation of dirt on the brushes simply smeared the sooty mold around the fruit and left them very dirty, and we had to go back and change all these washers that we had sold and extend the pipes to the full length of the machine and since that date we have always had the machines built with pipes going the whole length.

We used to manufacture the Stebler washer. I do not know when the first Stebler was sold in Florida, but probably it was soon after we purchased the patents from Stebler.

That type of washer is a cylindrical spiral washer, similar to the Parker except that in the case of the Parker the brushes are not true cylinders but they are octagon in shape, whereas the Stebler is a true cylinder with an even spiral. On the Stebler brushes water was used. They had a pipe extending over each runway formed by the two brushes.

In no packing house did I ever see any washer in which the brushes were not sprayed with water continuously during the operation. I might say there also that we purchased the Parker patents and our catalog show the spray pipes in that particular washer very plainly. Going around in these various packing houses prior to 1924 I never saw any white deposit of any kind on the drier or other part of the ma- [fol. 393] chinery. Nowadays where there is any borax being used, whether cold or hot treatment, it is quite evident by the white powder that occurs, especially at the drier and the polisher and grading belts and sizes.

Prior to 1924, I never saw any packing house in which there was a soaking tank or any kind of a tank holding the water to which the oranges went after or beyond the washer. Since 1924, I have seen such in several American fruit growers' houses. In those that I have described previously and I have seen one in two or three houses of Chase & Company.

In my work around Florida prior to 1924, or any other time, bluestone and permanganate, was used in the water. It was thought it would prevent blue mold decay, and it

was also used at one time when we had trouble with the disease called wither-tip on grapefruit. I think the permanganate of potash was perhaps a little better on that than the bluestone. I never heard of it having any effect on blue mold. Invariably even where it was used in the soaking tanks, the washers still had the water over them and I believe it was washed off.

About the temperature of the water in the soaking tank: the earliest packing house of any size was the Temple House at Winter Park, and there they depended almost entirely upon the heat of the water to assist in the drying. They went rather to extremes there. They got as high as 115 or 120 degrees, and then, later on, as I testified the other day, they used the overflow water from the gas engines which was probably of the temperature of 160 degrees, but they did not raise the tanks to that temperature, because of the cool fruit continually flowing in, but that practice was gradually abandoned, for two reasons. In the first place, the Parker Machine Works came into the state, and were building a dryer which they called a cold air [fol. 394] dryer, and they emphasized the advantage of cooling the fruit and preventing decay, and made it rather difficult to sell driers which were heated in any form, whether in hot air driers or driers depending upon the use of hot water to assist in drying. At Eustis, the day I went through, Mr. Ramsey was there. He had some charts, I remember particularly, showing the time element with relation to the reducing of temperature on the fruit in the center of a box shipped under refrigeration in iced cars.

As to whether grapefruit is liable to blue mold decay more than oranges, my observation has been that it is not as susceptible to decay as oranges.

I sent this telegram that Mr. Neave showed me. It was followed up by confirmation. The telegram reads:

"Please prepare for us ten boxes fruit packing one end each box with fruit treated by Brogdex system and other end with fruit not treated, suggest you buy five boxes from house using your process and five boxes from some one not using process and repack using treated fruit in one end each box and unload"—The confirmation shows that word

was wrong. It should be "untreated"—"in other end would suggest size 176 as being most attractve type ship one box as soon as prepared to James P. Gardiner care Hanover National Bank New York City, and one box to J. R. Morris care of General Refrigeration Company, Beloit, Wisconsin. Will send shipping instruction for eight boxes in few days. Please prepay expense charges."

This size 176 refers to the number of oranges in a box, and of course that indicates the size of a particular orange. I wanted to send the box treated this way to some of my friends to demonstrate the value of the process over the usual method of shipping fruit.

[fol. 395] (The telegram was received in evidence and marked "Plaintiff's Exhibit No. 82.")

(The confirmation was received in evidence and marked "Plaintiff's Exhibit No. 82-A.")

Cross-examination.

By Mr. Morton:

I sold those washers that had the pipes that poured water on the brushes about 1909. Some of those were in use for quite a period after; I think ten years later I ran across them once in a while. They were rather crude but I ran across them in the state sometime after. They are not in use, you know, without the pipe, because we had to change the pipe to use them. That change was made during the succeeding season. They were made during the summer time. I was not actively engaged in the machinery business at that time, but I got active again in it in—let's see, 1911; the fall of 1911, early in 1912 more active. I mean the summer of 1912.

In installing some of these washers, I provided a valve in the pipes to control the flow of water so I could shut it off. I used the ordinary valve, just the ordinary control valve but to shut the water off rather than to regulate the water but it was just an ordinary globe valve that I could screw up as far as I wanted to, or open it wider. This was common in machinery at that time.

I have heard of the Warner washer. They had a tank in which the oranges were put. I have seen them in operation. I will describe that washer and just how it worked.

It comprised a tank about, I would say, fourteen feet long; twelve to fourteen feet long, about three feet wide and three feet deep. Inside of this tank was a cylinder about twenty inches in diameter and eight feet long. This cylinder is supported—it was a hollow cylinder with no access or [fol. 396] opening and lined with burlap. The burlap was—underneath the burlap was a hose or rope. It wound up into a spiral so that the fruit introduced at one end of the cylinder, with the cylinder rotated, would be pushed out the other end, on account of the fact that they would float up against the top of the cylinder. The cylinder was placed about the center of the tank so as to leave a space at either end. The fruit was dumped in at one end and taken out of the tank at the other end by hand, usually, and the rotating movement of this cylinder, which rotation motion was given by a pinion gear engaging a ring gear on the outside of the cylinder, would cause the cylinder to rotate.

XQ. 62. A washer like that would hold a considerable quantity of fruit, would it not, Mr. Skinner?

A. I would say you could get three or four boxes in there without damaging the fruit. That is, if you filled it too full you might injure the fruit.

XQ. 63. You had enough fruit in there to keep the twenty-inch cylinder pretty full, did you not?

A. My belief would be that they would be submerged below the top of the cylinder about six or seven inches. That is to say, you take the inside of the cylinder, they would be down to some level below it.

XQ. 64. Yes, six or seven inches below the top of the inside of the cylinder?

A. That is right.

XQ. 65. Further down would be full of fruit?

A. Further up, you see, the fruit floats on top of the water.

XQ. 66. I thought you meant that the water would be?

The water would be above that so that the fruit would be kept pressed up against this burlap that did the cleaning.

The fruit would be passing through a washer of that kind three or four minutes. There was no spray or anything in [fol. 397] connection with a washer of that description.

I have a circular of the Nye washer. There is no spray on that washer.

Redirect examination.

By Mr. Neave:

With these washers that had sprays there was a valve by which you could turn the water on or off. I never saw any of those washers in operation washing fruit when the valve was closed. The valve was adjusted wide open. I will qualify that to say this: That in some places where they had city water pressure with the needle holes, or the drilled holes in these pipes, if they opened the valve as wide under these conditions with city water pressure, the water might splash out of the washer, in which case it would be cut down to reasonable limits.

In the Warner washer there was no spray. There were no brushes in those washers. The cleaning was done under water.

This is an illustration of the Nye washer I was speaking of. It is the circular I referred to. There is a wooden tank down at the bottom. In that there is water.

The oranges were introduced on the brush. There is a cogwheel shown at the upper end and there is another cogwheel at the lower end, mounted on a shaft. It is not visible because this part indicated happens to be in the way; and these cogwheels carry a chain on which are attached what are called the travelling brushes. Fruit is introduced by a hopper not shown in the picture onto those travelling brushes and the upper brushes are kept wet by the action of the brushes which come out of the water being very wet. They throw considerable water around. In this picture it does not show a pan that is generally put under all commercial installations to catch that water to keep it from spreading over the packing house.

[fol. 398] Redirect examination.

By Mr. Neave:

R. D. Q. 81. Mr. Skinner, what is the fact with reference to the use of water on the brushes in washing machines? Has there been any change in that or difference in that before the borax treatment came in—I mean since the borax

treatment has come in, as compared with what the situation was before the borax treatment came in?

A. Well, in any washing operation, whether using borax or plain water, if you do not put either the borax solution or the water on the fruit as it is being scrubbed, you simply smear the dirt around on the orange. You take washing your own hands, for instance. If you pick up a brush; wet your hands, and then pick up a brush and scrub your hands you loosen the dirt. You can imagine if you went out then with this loosened dirt all over your hands wet, and let it dry, your hands would still be dirty. So that the operation of scrubbing to get rid of the dirt with borax solution, or water; after you have loosened the dirt you have got to rinse it off, and with the borax installations as made in the patent in suit, the borax solution takes the place of water as far as the ringing action goes.

R. D. Q. 82. That brings that out. Now, before the borax came into use, you had your soaking tank and your washer, the brushes; what kind of water was played on those brushes?

A. Fresh water.

R. D. Q. 83 Fresh water. Now, in the particular installations that you make under the Brogdex system, where do you apply your borax, in the soaking tank or subsequently?

A. Both.

R. D. Q. 84. You do put it in the soaking tank, do you?

[fol. 399] A. Yes.

R. D. Q. 85. When you come to the brushes and spray water on the brushes; what water do you spray on the brushes?

A. We use the borax solution. We take it right out of the soaking tank.

Mr. Neave: I offer in evidence the Sandlin article which has previously been marked Plaintiff's Exhibit A for Identification.

(Received in evidenced and marked "Plaintiff's Exhibit No. 83.")

JOHN F. BAUCHELLE

JOHN F. BAUCHELLE, called as a witness in rebuttal on behalf of the plaintiff, having been previously duly sworn, testified as follows:

Direct examination.

By Mr. Neave:

I live at Pomona, California, and am associated with the Brogdex Company. I have been with that company two years and four months. I have charge of all construction of the machinery. Mr. Barke is my immediate superior.

I know Mr. A. H. Morgan, of the packing house of the Rialto Heights Association in California.

I first met him, I think, about the latter part of April, 29th of April, 1926. I met him at his packing house.

Mr. Barke showed me a letter on the morning, I think, of April 29th, and this telegram requested that we pack ten boxes of fruit.

I identify Plaintiffs' Exhibit 82 as that telegram.

Mr. Barke asked me to go to the house and get the neces- [fol. 400] sary fruit to comply with this telegram. He did not give me any additional instructions.

I went to Rialto to Mr. Canaday's house to get this fruit, but when I got there I found that due to the season being late the fruit was very poor, so I did not get the fruit from Canaday. Mr. Canaday referred me to Mr. Morgan and I went to Mr. Morgan's packing house. I went into the house and asked for Mr. Morgan and one of his men told me he was in another part of the house. He came in about twenty-five or thirty minutes. While waiting for him I inquired from two of his operators whether they were using borax.

For the purposes of this telegram I had to get fruit that was washed in soap and water only. Both of these men told me they were not. I made other observations to satisfy myself as to whether or not borax was being used. I went to the head of the sorting table, and as the oranges came on the sorting table I picked some up and touched them with my tongue.

At that time it was my habit of determining whether borax was being used; it was a test I used myself to assure me whether borax was on an orange or not.

I then walked back and waited ten or fifteen minutes till Mr. Morgan finished talking with a man in the corner of his packing house, and when he came to me I introduced myself and said I was Mr. Bauchelle from the Brogdex

Company. I told him I would like to get about 400 pounds, as I estimated at first, of oranges that had been washed in soap and water, that had been untreated; that is the way I put it at first, and he was very nice and told me I could have the fruit. I asked for size 176.

Several times I put it when I first asked him if he was using borax, and as we were walking along I said, "Now, as I understand, Mr. Morgan, those are washed in soap and water only," and he said, "Yes." He did not say anything [fol. 401] to me about his ever having used borax. He did not dicuss it at all.

When I specified 176 size oranges, Mr. Morgan picked up a field box and he himself carried this box to the bin, 176 bin, and I reached over and he reached over to put the oranges in this box.

I was rather embarrassed to have him stand there while the oranges were rolling in. The bin was empty and I suggested to him that we would wait till noon and then his men would get the required 400 pounds. He said that was all right, certainly.

My truckman was over to Mr. Canaday's house and I walked back; it is just a short distance, I should say perhaps a thousand feet.

In the afternoon I went over with my truckman and the fruit then had been put in field boxes—not in field boxes, but in packed boxes, what we call jumbled, and the truckman took the fruit and I went with Mr. Morgan to his office and paid him in cash for that fruit. I then took them over to Mr. Canaday's house.

Q. 41. And what did you do with them there?

A. Let them stay there until I got——

Q. 42. As far as that day was concerned, you let them stay there?

A. Yes.

Q. 43. Have you refreshed your recollection in any way as to the date of this occurrence?

A. Yes, sir. I have a diary that I keep and on that date I wrote down my observations or what I had done that day.

Q. 44. And have you used that diary in connection with this testimony?

A. That is my regular diary; yes, sir.

Q. 45. Let us see what your diary entry is. Suppose you just read what entry you have, giving the date.

[fol. 402] A. This is under date of Thursday, April 29:

"Purchased 400 pounds oranges Sun Kist No. 176's from Morgan Mngr. Rialto Heights Association Exchange House. These were washed in warm water and soap only——".

And I notice I have underlined the word "only"——

"took them to Cannedy and had them wrapped and placed them at opposite ends of ten boxes from Brogdexed fruit to send as directed by Skinner."

Q. 46. Will you let me have that?

Mr. Neave: Do you want to see that, Mr. Morton?

Q. 47. Did you do anything about getting oranges to place in the other ends of these boxes?

A. Well, I must make a correction. When I went to Mr. Canaday's house that day, we put those oranges in the ends of the ten boxes and it was then I discovered we did not have enough fruit to fill the opposite ends when I had treated with Brogdex, the Broddex process.

Q. 48. And then what did you do toward getting fruit to be treated?

A. I came down to Pomona that night and was talking about what I had done during the day and Mr. Barke wanted to make certain that I was sure that the oranges had been washed in soap and water only, and I told him that I had repeatedly asked that question, and that by tasting the oranges I was practically certain there was no borax being used, and he impressed upon me rather strongly that I must make sure about no borax being used, and I told him I was going up the next morning to get more oranges from Mr. Morgan to process and put in the opposite ends of the boxes.

[fol. 403] Q. 49. What were those additional oranges? Had you made any arrangements about them?

A. Yes, with those oranges that I got on the 29th, when I took them from Mr. Morgan, I felt that in order to make a proper demonstration, I should get oranges from that same house, and I spoke to Mr. Morgan and he said in

the morning they would have oranges coming in either from the same grove or the same general district.

Q. 50. And did you go back the next morning for those oranges?

A. No, I did no.

Q. 51. What did you do about it?

A. I intended to go back but when I got to my office, I had so much to do, I sent my truckman up there to get these additional oranges.

Q. 52. Did you give him anything with which to pay for that fruit?

A. Yes, I gave him a check.

Q. 53. What check?

A. Mrs. Bauchelle's check.

Q. 54. Why did you give her check?

A. I was in my car and just about to leave the house, and I suddenly remembered the bank would not be open until nine o'clock, and I asked her if she would sign a check in blank and hand it to me.

Q. 55. Why in blank?

A. I did not know how much those additional oranges would be.

Q. 56. And what did you do with that check of hers signed in blank?

A. I gave it to the teamster, when he went to the Rialto, I told him to pay whatever was necessary for this fruit.

Q. 57. Have you that check here?

A. No, I think you have it.

[fol. 404] Q. 58. I have it, yes. And the bill or memorandum bill for the fruit?

A. Well, that I think is with the check.

Q. 59. This is the check and this is the memorandum bill (handing)?

A. Yes.

Mr. Neave: I offer those in evidence.

(The check was received in evidence and marked "Plaintiffs' Exhibit No. 84.")

(The memorandum was received in evidence and marked "Plaintiffs' Exhibit No. 84-A.")

Q. 60. How do you happen to have this check and bill?

A. Well, I think that sometimes in October or November

Mr. Brogden spoke to me about this matter and as I was discussing it, I told him I would like to look up in my diary, and in the course of looking it up I mentioned it to Mrs. Bauchelle and she said she kept her checks, and possibly might have that check.

Q. 61. And she gave it to you?

A. What is that?

Q. 62. And she gave it to you?

A. Yes.

Q. 63. Where did you get the bill?

A. The bill came from the Los Angeles office. We send our bills in there every so often.

Q. 64. When was it that Mr. Brogden spoke to you about this?

A. In the Pomona office.

Q. 65. And when was it?

A. I could not tell you, maybe there is a note in the diary as to when that was; look and see.

Q. 66. Can you tell from your diary what your best recollection is on that as to when Mr. Brogden spoke to you about this matter?

[fol. 405] A. I think so. (Referring to diary.) On Saturday, November 13.

Q. 67. Now, with reference to this fruit which you say this check was paid for, when did you see it next?

A. This check?

Q. 68. No. When did you see the fruit?

A. I went up that afternoon to Rialto following the truckman.

Q. 69. Went to whose house there?

A. I went to Mr. Morgan's house.

Q. 70. And was the fruit at Mr. Morgan's house at that time or had it been taken away?

A. I am not certain whether the fruit was standing there or taken away. Well, I went to Mr. Morgan's house to again assure myself that he was not again using borax.

Q. 71. Did you talk with him about it or go through the plant?

A. Yes, I talked with Mr. Morgan.

Q. 72. What did you say to Mr. Morgan?

A. Well, in the course of conversation I asked again if the fruit was washed in soap and water only and also if the fruit had been boraxed, as I put it to him, and again

he said no. I think I must have asked Mr. Morgan six or eight times in the two days, whether he was using borax.

Q. 73. This fruit that you bought on this second occasion, that is, on the 30th of April, what became of it?

A. That fruit was taken to Mr. Canaday's house.

Q. 74. And what was done with it there?

A. We put it through the complete Brogdex process, which consist of boraxing and covering with paraffin.

Q. 75. And then what did you do with that fruit?

A. We wrapped it and put it in the opposite end of the ten boxes.

[fol. 406] Q. 76. Have you anything other than the letter and the bill to refresh your recollection as to the second purchase and the first purchase; is there any entry in your diary about it?

A. Yes, there is.

Q. 78. And did you use that to refresh your recollection about it to testify here?

A. I did.

Q. 79. Under what date is that entry and what is the entry?

A. That is the next day, for the 30th of April.

Q. 80. And what is the entry?

A. "Rialto bought 416 pounds of additional fruit from Morgan. This makes 816 in all. Processed one-half of above at Cannedy's and put other half in opposite end of boxes, untreated."

Q. 81. Then what did you do with those packed boxes?

A. We took those to Pomona and shipped them as directed.

Q. 82. Did you ship away all of this fruit?

A. We did not.

Q. 83. What did you keep of it?

A. There was one-half of a box of the Brogdexed fruit, that is the way the fruit finally worked out, and then there was one-half of fruit——

Q. 84. One-half a box?

A. There was one-half of the box remaining, say the eleventh box, was filled completely with Brogdexed fruit, that is, the completely processed fruit and the other half, well, I would say about two-thirds of that was filled with oranges which I supposed were washed in soap and water only.

Q. 85. You used the term Brogdexed. What did you mean by that?

A. We speak of the Brogdexed fruit as the fruit which [fol. 407] has been treated with borax and then with paraffin.

Q. 86. What happened to these portions of the fruit you retained and did not ship away?

A. We kept that box as a sort of a check.

Q. 87. And did you observe it from time to time?

A. Yes.

Q. 88. What did you observe with reference to the fruit as to its keeping qualities?

A. I cannot be exact on the time but the ultimate thing that happened was that the Brogdexed fruit was standing up well when the other fruit was decidedly decaying.

By the Court:

Q. 89. That is, one end of the box was filled with Brogdexed fruit and the other was Morgan fruit?

A. Yes, sir.

By Mr. Neave:

Q. 90. In describing your first day's visit to Mr. Morgan, you and he picking out these sizes, 176——

A. We did not pick out the sizes. The sizes were there.

Q. 91. I mean picking up oranges of that size, you said you began that and then you said you were somewhat embarrassed, what did you mean by saying that?

A. Mr. Morgan stood there holding the packing box and I did not want him to stand there waiting for a bin to fill up with oranges while he held this box weighing eventually 75 to 80 pounds.

Mr. Neave: That is all, Mr. Morton.

Cross-examination.

By Mr. Morton:

X Q. 92. You say you got that telegram in Los Angeles? [fol. 408] A. No, Mr. Barke handed me that telegram.

X Q. 93. You did not get the telegram yourself at all?

A. It was simply handed to me.

X Q. 94. And where were you at that time?

A. In the office.

X Q. 95. Whereabouts?

A. At Pomona.

X Q. 96. You do not know anything about the telegram except it was handed to you?

A. That is it.

X Q. 97. Have you had any connection with the citrus industry before your employment with the Brogden Company?

A. Never.

X Q. 98. How long have you been employed by them?

A. To be exact two years ago, the 27th of last October.

X Q. 99. You are quite familiar, are you not, with the number of houses that are using the Brogden process?

A. I am.

X Q. 100. And you also know that a number of the other houses are using a process recommended by the Government?

A. No, I do not know the number of those houses, I know of some of them.

X Q. 101. You know there are quite a number of houses using borax at the recommendation or under a formula that they call the Government formula, you have heard of that?

A. I do not know whether they are using the Government formula. I know they are using borax.

X Q. 102. How many people did you ask about borax in the Morgan house?

[fol. 409] A. There were two different men and they were rather near the door and Mr. Morgan himself.

X Q. 103. When you first went there, I understand you to say that you asked some of the employees about the borax?

A. I said I asked two of the operatives.

X Q. 104. And both of them said no?

A. Absolutely.

X Q. 105. And you were not satisfied with that, as I understand you?

A. Yes.

X Q. 106. Why not?

A. I wanted to be doubly certain on account of the demonstration I was going to make of the boraxed fruit.

X Q. 107. Why did you have any doubt about it?

A. There was no doubt about it any more than a person would concern himself when he was making a demonstration, I wanted to get fruit that was washed in soap and water only.

X Q. 108. Really you were satisfied in your own mind?

A. Yes, sir, I think I was.

X Q. 109. And you had tasted the fruit in there?

A. I did.

X Q. 110. And you were not satisfied then?

A. It was not a case of being satisfied. It was a case of assuring myself that the fruit had been washed in soap and water only. It was simply an unconscious move perhaps—I would not say an unconscious move, I wanted to be sure that the fruit was washed in soap and water and did not have borax on it.

X Q. 111. You had been in lots of houses that were using borax, had you not?

A. Yes, sir.

X Q. 112. How much borax do you use and recommend in the Brogden process?

[fol. 410] A. It depends on the condition of the fruit.

X Q. 113. Did they have a specific concentration that they recommend?

A. I do not get that question.

X Q. 114. Do not they have a regular concentration that they recommend to different people to use?

A. Not for all times. It varies.

X Q. 115. How does it vary?

A. It may be eight or ten or twelve ounces and it may be six ounces per gallon.

X Q. 116. Sometimes as low as six ounces per gallon?

A. I have had it six ounces.

X Q. 117. In the Brogden process?

A. Sometimes.

X Q. 118. Sometimes eight ounces and sometimes ten?

A. Yes, sir.

X Q. 119. You have been in lots of houses that used that process, had you not?

A. Yes, sir.

X Q. 120. Did you not observe a coating of borax around on the machinery wherever high concentration of borax was used?

A. Yes.

X Q. 121. You have been in the Exchange houses using borax that were not the Brogden licensees, have you not?

A. Very few.

X Q. 121. Have you been in any?

A. Yes, I have been in one. One is all that I can recall now, that I have been in.

X Q. 122. The machinery there was similarly coated, was it not?

A. I do not remember.

X Q. 123. You do not remember?

A. No.

[fol. 411] X Q. 124. How about the Morgan machinery, did you see any indication of the borax there?

A. I do not remember that and I will tell you why. The soaking tank was up in the air, and I have not been in that house from that time to this and as I recollect it the soak tank was in the air and his brushes were up in the air. I am not certain about that.

X Q. 125. The whole machinery was up in the air?

A. I could not say definitely at all.

X Q. 126. What do you remember about it?

A. I remember all I have told you.

X Q. 127. And the machinery was on the floor?

A. The only thing that I saw on the floor was the oranges as they came on to the sorting table where I had touched a few of them with my tongue.

X Q. 128. Where did they come from?

A. From up above somewhere. I was not there for that purpose. I was there to get some fruit to make this demonstration.

X Q. 129. You do not know whether the polisher was on the floor or not?

A. I do not think he uses a polisher. We call our polisher on the Brogdex machine the polisher.

X Q. 130. All the houses use some sort of a towel or something——

A. That is a towel that comes after the washing and before they go to the drier and then from the drier they go to the sorting table.

X Q. 131. But do not they all use polishers between the drier and sorting table?

A. I can speak only for our own houses, I do not know about the others.

X Q. 132. All your houses then?

A. Yes; we put the Brogdex on it.

X Q. 133. Don't the others have brush polishers?

A. It would be impossible for me to tell you about the others because I have not been to them.

[fol. 412] X Q. 134. You do not know anything about that?

A. No.

X Q. 135. And all you recall is that the orange came down to the grating table from somewhere in the house?

A. Yes.

X Q. 136. Did you say anything to Mr. Morgan about what you wanted the fruit for?

A. I think that I told Mr. Morgan I was making a demonstration and I believe I told him that when I asked about the fruit the next morning that I wanted to get fruit as much like that as I obtained on the 29th.

X Q. 137. Did you tell him that you were a representative of the Brogden Company?

A. When I first met him I introduced myself as such.

X Q. 138. Did you tell him anything about the Brogden process?

A. No.

X Q. 139. You did not?

A. No, sir.

X Q. 140. You did not endeavor to interest him at all in the Brogden process?

A. The only thing I said when I left was, "Well, Mr. Morgan, some day we hope to put our process in." I sort of said that when I said good-bye and he said, "Well, maybe," and that was his answer to me.

X Q. 141. Did you tell him what the process was or anything like that?

A. No, we did not discuss that at all.

X Q. 142. And how many times did you ask Mr. Morgan about the borax on his fruit?

A. That is hard to answer, but I asked him repeatedly because that was the main thing that I must find out.

X Q. 143. Why did you find it necessary to ask him repeatedly, what object would he have in not telling you once for all?

[fol. 413] A. He did, he did tell me at the outset and had I suspicioned him I certainly would have found out where his brushes and washers were.

X Q. 144. Did you not suspicion him if you asked him four or five or six or seven times?

A. No, sir, just in confirmation?

X Q. 145. Do you know where that telegram was received?

A. No, I do not, except Mr. Burke gave it to me on the morning of the 29th of April.

X Q. 146. Why do you think he brought it out to you?

A. You will have to ask him.

X Q. 147. I do not know if he is here.

A. I do not know what he thought.

X Q. 148. You do not know anything about that?

A. I do not know why he brought it to me.

X Q. 149. You were not surprised at all when a telegram from Los Angeles was brought out to you in Pomona to buy some fruit?

A. No.

By the Court:

Q. 150. How far are the two places apart?

A. Thirty-three miles.

By Mr. Morton:

X Q. 151. How far is Rialto from Pomona?

A. Twenty-five and a half miles.

X Q. 152. How far from Los Angeles?

A. About thirty-three, too.

X Q. 153. You go through Pomona on the way to Rialto?

A. Yes, sir.

X Q. 154. Any packing house at Pomona?

A. Yes.

[fol. 414] X Q. 155. Have they any other packing houses in the vicinity of Los Angeles?

A. Oh, yes, many.

X Q. 156. A large number of them?

A. Very large number.

X Q. 157. It is quite a fruit center?

A. Yes.

X Q. 158. Are there any packing houses besides those at Pomona or the other packing houses within twenty-five miles of Pomona?

A. Many.

Mr. Morton: That is all.

Re-direct examination.

By. Mr. Neave:

R. D. Q. 159. What was Mr. Barke's position?

A. He is the field manager of the Brogden Company.

R. D. Q. 160. Where did he live?

A. He lives in Santa Monica, but he spends most of his week in Pomona.

R. D. Q. 161. Are any of the field men located in Los Angeles?

A. Of the Brogdex Company?

R. D. Q. 162. Yes.

A. No.

Mr. Morton: I object to that.

Mr. Neave: Why?

Mr. Morton: The question does not indicate whether they are located there now or when they were located there.

The Court: I sustain the objection.

R. D. Q. 163. At that time were there any field men located in Los Angeles?

[fol. 415] The Court: You do not object to the present question?

Mr. Morton: I object to that on the ground that it is leading. The proper question is what employees were located and where.

Mr. Neave: That has been asked and answered.

Mr. Morton: I really do not object to it.

The Court: You may answer the question.

A. There were not.

R. D. Q. 164. Please state whether or not Mr. Morgan said anything to you as to whether he considered borax was necessary?

A. In our conversation he said he did not think it was necessary.

R. D. Q. 165. What luck had he been having with his fruit?

A. I could not tell you that.

R. D. Q. 166. Mr. Morton seems to be inquiring as to why you did not go to some packing houses right in Pomona. Are there any right there?

A. The packing houses in Pomona are all equipped with the Brogdex process. There are other houses very close to Pomona, perhaps four miles one house is and they are using borax.

R. D. Q. 167. They were using borax then?

A. They are using borax.

R. D. Q. 168. Were there any other houses nearer than where you did go that were not using borax so far as you know?

A. Yes, there were a good many. All that were not using borax?

R. D. Q. 169. Yes.

[fol. 416] A. I could not answer that because it was by accident that I went to Mr. Morgan's house.

Mr. Neave: That is all.

Re-cross-examination.

Mr. Morton:

R. X Q. Why was it you underscored the word "only" in your diary?

A. I haven't any idea except to impress myself on that day that it was soap and water only and that is exactly how I wrote it.

Mr. Morton: That is all.

(Witness excused.)

Colloquy Between Court and Counsel

Mr. Neave: Your Honor, I do not know whether the notice to take the deposition came in evidence as part of the deposition, but I would like to note on the record that the notice of taking Mr. Albert H. Morgan's testimony in Cali-

fornia was served on the defendant on October 21, 1926, that was before Mr. Brogden brought this matter up to Mr. Bauchelle.

Mr. Morton: Before the answer was filed. I think it was even before the answer in suit was filed.

Mr. Neave: November, 1926. But Mr. Brogden brought this matter up on November 13th, Mr. Bauchelle testified here. That was after our notice had been received of the taking of Morgan's testimony.

Mr. Morton: I just do not catch the drift there.

Mr. Neave: I will tell you if you will permit me.

[fol. 417] The Court: I think I understand, but you may go ahead.

Mr. Neave: On April 29th and 30th, Mr. Bauchelle bought this fruit from Mr. Morgan. He apparently had forgotten all about it. Then we received notice of the taking of Mr. Morgan's testimony on October something, the later part of October, 1926, and then on November 13, 1926, Mr. Brogden asked Bauchelle whether he remembered going to Morgan's house and remembered anything about that transaction. It was then that Mr. Bauchelle looked up his papers.

Mr. Neave: Mr. Morton, I suppose you will agree to this (referring to defendant's notice of taking testimony in Florida).

Mr. Morton: I think that is in evidence.

Mr. Neave: What?

Mr. Morton: The deposition notice.

Mr. Neave: This is the notice in Florida.

The Court: In printing your record you might want to abbreviate it to that extent.

Mr. Neave: This is what I had in mind and the reason I was going to put a stipulation on the record. We received notice of taking the testimony of a great many witnesses in Florida. The testimony of some of those witnesses were taken and others were not taken. Some of those other witnesses whose testimony was not taken are people who are referred to in the defendant's depositions as people having knowledge of the uses down there. I wanted to have this record show that those people were known to these defendants so that in subsequent cases it cannot be said that they have not made a thorough investigation. And so forth, and also that they knew of these other people

[fol. 418] who are said to have knowledge of these things and gave us notice to take their testimony, and did not proceed with them, and I am entitled to some inference from that.

Mr. Morton: I think if there is going to be any testifying by counsel here, I might have a word on that.

Mr. Neave: I was not testifying, they are the substantive facts of record.

Mr. Morton: The notice is not of record, the notice that was given there. There were a large number of witnesses and notice given with respect to them because Mr. Steward, the attorney, going out there, I explained to him that I gave notices of all the witnesses that I had received notice of myself, but did not have an opportunity to personally investigate their story. The purpose of including them was to give him every opportunity to also investigate and shorten his stay in Florida as much as possible.

Mr. Neave: I ask that this notice of taking testimony in Florida be made a part of the record.

Mr. Morton: I object to that as immaterial.

The Court: That has not come before me before but does not that become a part of the record here in any event?

Mr. Morton: I do not know that it is necessary to offer a notice where counsel does appear and does not object. He is presumed to have notice. The Florida notice is not in the record here. There is a certificate which says pursuant to notice and——

Mr. Neave: Then I ask that this Florida notice be annexed.

[fol. 419] Mr. Morton: If we had not noted somebody that we called, they might have had some complaint.

The Court: I think that if it will serve any usefulness at all, that that ought to be made a part of the record. I think the notice may have some evidential value on some matters possibly not in the proceeding here, but you do not necessarily have to swear all your witnesses that are sumpœnaed but certain inferences may be drawn from it.

Mr. Morton: The objection to it is on the ground that it is incompetent, irrelevant and immaterial. We did not have to swear all the people at all that we called, and there is no inference one way or the other than I can see from giving notice.

The Court: In the conclusion to be drawn here, I think not. In the effect of the judgment here it might be.

Mr. Morton: It seems to me it is totally irrelevant and immaterial.

The Court: I think Mr. Neave is entitled to have the notice which he received in the proper progress of this case to be put on the record for any use that it may be. It has no use to me in deciding it so far as I know.

Mr. Neave: Then I offer it in evidence.

The parties have agreed upon a few changes in the depositions taken in California and Florida, I think, as I look at them they are all in the nature of typographical errors and we have stipulations here to that effect which I would like to——

[fol. 420] Mr. Morton: Suppose we hold that up until we decide to print the record.

Mr. Neave: The character of the changes ought to be noted whether we print or not.

The Court: Yes. Then you may print your stipulation.

Mr. Morton: There will be no controversy about it.

Mr. Neave: May I ask that it be filed so that it will be kept with the depositions to show what changes will be made?

Sixth Day

Trial Continued

U. S. District Court, Wilmington, Delaware, Monday, February 7th, 1927, at 11:30 o'clock A. M.

Before Hon. Hugh M. Morris, U. S. District Judge

Appearances: As before.

Charles A. Meyer

Charles A. Meyer was called as a witness in rebuttal on behalf of the plaintiffs and, having been duly sworn, testified as follows:

I live in Los Angeles. I did not come East for the purpose of testifying in this case. I happened to be around here, that is, I come East every year this time of the year.

[fol. 421] My occupation is that of soap manufacturer, with Los Angeles Soap Company. The position I hold with that company is that of president. I have been with that company since about 1912. There has never been any other Los Angeles Soap Company to my knowledge.

In the course of fifteen years I have been connected in every department.

The Los Angeles Soap Company was formed in 1860, and it is an incorporation now. It was incorporated in 1897. The products of the company are and have been laundry soaps, bar soaps, toilet soaps and vegetable oil products, and among laundry soaps I include what we call washing powders.

One of the principal washing powders which the Los Angeles Soap Company has made is Mermaid Washing Powder. But that is not all of one kind. It is segregated, two classes. There are two kinds, what we call our Special B and our Regular. My company has been making these washing powders since about 1898 and is still making them.

These Mermaid Washing Powders contained and still do contain what we call curd soap, which is the actual soap, the by-products of cotton-seed oil and the caustic. These two form the soap and are so-called fillers, the soda ash, and soda and perfumes, that is about all.

In substance these washing powders have not been changed in composition during all the years during which they have been made by my company, but it may be that we have added perhaps a little bit more soda or soda ash, a little more or less. The same ingredients have been in all the way through. We have never put any borax or boric acid or any other compound in the washing powders or soaps which my company has sold.

[fol. 422] The difference between the Mermaid Regular and Mermaid Special has been that Special B is used for spraying on citrus fruits; that contains a little more soda ash than the regular. The idea that we have in putting in more soda ash in the Mermaid B is that of a sort of a filler; it is a cleanser that is used mostly for washing the smut off citrus fruits.

My company has also made and sold a so-called White Borax soap and a so-called Calla Lily Borax soap. We have been making those, as the records we looked up show,

for about thirty-five or thirty-eight years. We are still making them.

In this White Borax and Calla Lily Borax soap we never use any borax; no borax at all.

My company is the largest soap business west of Kansas City.

Cross-examination.

By Mr. Morton:

The soda ash that is used as an ingredient of washing powder is not exactly a water softener. It has a tendency—most of that soda ash is used more or less as a filler when put in what is known as hard water.

There are different forms of soda ash. There is what we call trona, and a light and heavy soda ash. The effect any soda ash in the washing power on hard water when that washing powder is put in the hard water is to soften water, but I think you will find in the soap business it does not exactly do that. It is there used as a filler and has tendency as a cleansing agent. I say that because our special soaps in the bar soap line are hard water soaps and we have one now that is particularly fine for hard waters and there is no soda ash in this.

The chemical action that takes place when soda ash is put in hard water is that soda ash go s up in the form of [fol. 423] bicarbonate which is used as a softener of water. It possibly has an effect of softening of water as any water-softening preparation.

(Witness excused.)

ANTONE C. BARKE

ANTONE C. BARKE was called as a witness in rebuttal on behalf of the plaintiff and, being first duly sworn, testified as follows:

Direct examination.

By Mr. Neave:

I live in Santa Monica, California. It is about fifty miles from Pomona. My office is in Pomona.

I am connected with the Brogdex Company. My position with that company is that of field manager. I have been field manager, acting in that capacity since the latter part of 1922. I have been with the Brogdex Company since the latter part of 1922.

I have been requested here in Wilmington to make certain experiments with a washtub and oranges, using different quantities in a tub. I have made those experiments. I will describe what I did.

We had the washtub, which we filled with water to 3½ inches above the bottom. Then I put in two bushels of oranges, which heaped it to 3 inches above the tub level. The water was then 3 inches from the tub level; that is, 3 inches from the top of the tub; from the level of the tub. It was 6 inches below the level of the oranges.

This tub was 10½ inches high, 24 inches in diameter on the top and 21 inches at the bottom. I measured the 3½ inches from the outside.

We had a regular bushel measure to measure the two [fol. 424] bushels of oranges. After I put those two bushels of oranges into the washtub with the water it was not possible to wash the oranges in the water, because the oranges were way up above the water. I found out how much of the oranges it was necessary to take out in order to get enough water to wash the oranges. I had to get out one bushel before I could cover the oranges with water.

I then removed sufficient oranges so that the water would cover and make it possible to wash with water and as I have previously stated I took out one bushel. Then I filled the tub with oranges to the top level and added water to within one inch of the top, which required 2¾ gallons, making a total of 8 gallons that I had put in there to the tub. It took 5¼ gallons of water to come up to the 3½ inches, and the total amount of water necessary when the oranges were in the tub was eight gallons, in order to bring the water level up to one inch from the top when the oranges were in.

I heard Mr. Bauchelle testify here the other day. I recall the incident of which he spoke very well indeed. At the time when that incident arose the packing houses around Pomona were running very intermittently; it was at the end of the Navel season.

The next season that we have there in oranges is the Valencia season. The Valencia season probably had begun so far as the packing houses were concerned in the isolated places, most favorable for maturing fruit.

The seasons are the same just around Pomona and around Rialto, except that probably in Rialto and through the Redland district, the Navel season may last a little bit longer.

At that time I had information that there was a house in Rialto that we call Canaday's house that I knew was running at that time.

[fol. 425] I told Mr. Bauchelle to go to Rialto and try to make arrangements with Mr. Canaday's to secure some oranges which were required for a demonstration, for demonstrating purposes.

I told him that the purpose of this work was to secure processed oranges, to fill half a box, and untreated oranges in the other half of the box.

As to getting of the untreated oranges, I knew when this problem came up that it was very difficult to secure untreated oranges because it was late in the season and a good many of the houses were closed and besides so many houses were using borax, and the most important point was to get this untreated fruit. That was the most important point involved in this work.

I told him that if he could not obtain oranges from some houses that were not using borax or using any process that it probably would be necessary to get oranges direct from the field and wash them in a tub by hand.

He telephoned me from Canaday's house that the fruit that particular day was poor grade, was poor quality, overripe, and also that there was no liklihood that the fruit would improve until the end of the season and said that he had consulted with Mr. Canaday and Mr. Canaday suggested that they go over to Morgan's house and see if they could obtain the necessary fruit there. I had not previously given him any instructions or suggestions to go to Morgan's house.

Cross-examination.

By Mr. Morton:

Mr. Neave: May I interrupt you a second? I forgot to state as I intended to state, that that tub and those oranges

are at W. G. Mahaffy's office and if you want to see them during the recess, of course you may see them there.

[fol. 426] The oranges that I used in this tub and water experiment which I described were 176's; that means 176 oranges in a standard size orange box.

I did not examine every orange. I think probably that they were California oranges. I do not know where they came from because I did not order these oranges. That experiment with them was done here in Wilmington.

I would not say postitively that I could tell the difference between a California and a Florida orange because I have had very little experience with Florida fruit. I would have to be told probably that they were from Florida before I could see the difference. I could of course if I cut them open and tasted them because it is a different orange. I do not know that California oranges are lighter weight than Florida oranges. My experience has been entirely with California oranges.

Walter A. Boone

Walter A. Boone was called as a witness in rebuttal on behalf of the plaintiff and, being first duly sworn, testified as follows:

Direct examination.

By Mr. Neave:

I live in Chardon, Ohio. My occupation is that of carpenter. I have been in that trade, I should say, twenty-five or twenty-six years. I am now fifty-six.

I have worked in the citrus fruit packing house at Eustis Packing House. The name of the concern that operated that packing house was Eustis Citrus Growers Association or Exchange, I do not know which it was. The head person of that packing house was Mr. Pond.

[fol. 427] I went to work there in the fall of 1913. I had not previously been living in Florida. I happened to go down in Florida because my health was not very good and I had a chance to work down there and my neighbors had friends that were going on down and they thought I better go down and I had a chance to work and I went.

My work at the Eustis Packing House, with another gentleman, was running a washing machine. The kind of fruit going through the washer were oranges and grapefruit. The name of this other man I spoke of was Mr. R. V. Locey. We two men were the only ones working on the washer. In working on the washer we changed around; sometimes he would wheel up and I would dump; then we would change and I would wheel up and he would dump.

I went there about the first of December, 1913, and I stayed until the last of March, 1914. I did not stay in the South after that; I came North.

This man Locey that I spoke of is not living now.

When washing the fruit at the Eustis Packing House we dumped them into a tank with water in it and I should say the tank was around four or five feet wide and maybe ten or twelve feet long and it was about two feet deep maybe, and it was within six inches of being full of water. From the tank the fruit went right on to the washer. It was taken up on the washer on an inclined roller. I could not tell you the name of the washer.

There were four disc brushes, four places where the oranges went down through it and in those places maybe there was a foot wide or ten inches, and there was some discs in there with brushes, you know, and they were revolving all the time and kept the oranges moving all the time.

It washed the color off from them, the smut, we always called it, there was water playing on those brushes while the fruit was being washed.

[fol. 428] There were little pipes above the brushes with little holes in them that squirted down on them. There was a valve that you could operate to shut the water off if you liked, or turn it on.

When operating the valve was partly open. Maybe it sometimes might be open, but I do not think it was open more than to keep enough water running on that all the time. I never operated that washer with the valve closed. Those pipes were connected to the city water.

Q. 34. Now, with reference to the soaking tank that came just before the washer, what did you put into that soaking tank besides water and oranges?

A. We put some Rub-No-More washing powder in.

Q. 35. Anything else?

A. No, sir, I never did.

Q. 36. Did you ever see anything else put in?

A. No, sir.

Q. 37. Did you ever use any borax or boric acid?

A. No, sir.

Q. 38. Did you ever use any borax or boric acid around the place?

A. No, sir.

Q. 39. Now, I want to know whether you were in a position to see what was put into that soaking tank, what were you doing with reference to the soaking tank and with reference to the water?

A. I used to work there all the time; I never saw anything more put in there.

Q. 40. How often was the water changed?

A. Sometimes once a day and sometimes every other day.

Q. 41. And who attended to the dumping of the water?

A. Sometimes I would and sometimes Mr. Locey.

Q. 42. And how was the tank filled up again with water?

[fol. 429] A. With a pipe through the water main.

Q. 43. And who filled that tank up with water?

A. Well, just as I say, sometimes he would and sometimes I would.

Q. 44. When the washer was operating, were both of you working on the washer at the same time, or did you take turns to work on the washer and then he?

A. We would take turns, while one was dumping to put them into the tank, the other was wheeling them up.

Q. 45. But you were working together?

A. We were working together.

Q. 46. I was not sure whether you were on one day and he another day?

A. Oh, no, we were both there at the same time.

Q. 47. You have spoken of putting some washing powder in; who put that in?

A. I have put that in and I have seen Mr. Locey put it in.

Q. 48. What did you do, just how did you put the washing powder in?

A. We used to get the packages and break them open and dump it right in and stir it up with a stick.

Q. 49. Did the adding of the washing powder after it was stirred up change the appearance of the water in any way?

A. It looked a little milky.

Q. 50. Did you know a Walter A. Robinson there at the Eustis Packing House?

A. Yes, sir.

Q. 51. What was he doing around there?

A. He was foreman.

Q. 52. Did he or any one else there ever say anything to you about putting borax or boric acid in the wash water?

A. No, sir.

[fol. 430] Q. 53. Did you ever see any more of this Mr. Robinson after you left Eustis?

A. Yes, sir.

Q. 54. Where?

A. I saw him at New Smyrna.

Q. 55. When was that?

A. In 1920 and 1921.

Q. 56. What was he working on there?

A. He was foreman in the packing house.

Q. 57. And you were in the packing house?

A. I was working.

Q. 58. In that same packing house?

A. Yes, sir.

Q. 59. And did you see him subsequently after that?

A. Yes, sir.

Q. 60. In what years?

A. 1924, and 1925, and 1926.

Q. 61. Where was that?

A. Down at Oak Hill.

Q. 62. How did you happen to see him there?

A. He was working in the packing house.

Q. 63. That was another packing house, was it?

A. Yes, sir.

Q. 64. And what was his position in that packing house; what was he doing there?

A. He was superintendent or manager.

Q. 65. Was there ever any borax or boric acid used in this packing house at New Smyrna or Oak Hill while you were there?

A. I could not say. I did not work a washing machine at those places.

Q. 66. Did you see any?

A. I never saw any.

Q. 67. Who was the manager of the packing house at Eustis when you were there?

A. Mr. Pond, and Mr. Robinson was foreman.

[fol. 431] Cross-examination.

By Mr. Morton:

X Q. 68. Do you know what boric acid looks like?

A. Well, sir, no. I would not swear as I did; it is kind of a white powder if I understand it right; I would not say.

X Q. 69 Do you know what borax looks like?

A. Well, no, I would not say. I am no chemist. I could not say about that part of it.

X Q. 70. You said you did not see any borax or boric acid around the packing house; what do you base that statement on?

A. Not that I know of. I could not say, sir, about borax, because I can not now. The only thing I ever saw was the packing——

X Q. 71. They had lots of other things around the packing house in the way of materials, did they not, wax?

A. Yes, sir.

X Q. 72. Soap and other things?

A. Yes, sir.

X Q. 73. Do you remember everything they had around there?

A. How is that?

X Q. 74. Do you remember everything in the way of material they had at the packing house?

A. I do not know as I understand what you are asking for.

X Q. 75. You said you did not remember that they had borax or boric acid, and you did not know what they looked like, so I am trying to find out what you base that statement on?

A. I could not say what borax or boric acid is, because I do not know.

X Q. 76. Mr. Robinson was foreman when you were there?

[fol. 432] A. Yes, sir.

X Q. 77. He was in charge of all the operations was he not?

A. Yes, sir; inside.

X Q. 78. Inside the packing house including the washing of the fruit?

A. Yes, sir.

X Q. 79. He superintended everything?

A. Yes, sir.

X Q. 80. What time of day was the tank cleaned out?

A. Generally in the evening, when we quit work.

X Q. 81. And what time of day did you put the washing powder in?

A. In the morning when they filled the vat.

X Q. 82. Did you use washing powder at the time or just use it when the fruit was dirty?

A. We used it pretty much all the time.

X Q. 83. Did you ever see Mr. Robinson put anything in the tank?

A. No, sir.

X Q. 84. Never saw him put the washing powder in?

A. No, sir.

X Q. 85. Where did they keep the washing powder?

A. They bought it in the boxful there and kept it right back there in the building. We had to go and get it and put it in.

X Q. 86. Did they have a store-room there?

A. It was not a store-room, but it was set right back.

X Q. 87. Did they have a store-room there?

A. They might have had for all I knew.

X Q. 88. You do not know whether it was a store-room or not?

A. No, sir.

[fol. 433] X Q. 89. Did Mr. Robinson tell you every time to put the washing powder in, or did he tell you to use washing powder when the fruit was dirty?

A. No, sir. He told us to put the washing powder in. I know once we did not put it in and he finally called us down for it.

X Q. 90. He told you to put that in every time whether the fruit was dirty or not?

A. Yes, sir.

X Q. 91. What sort of a package was that in, do you remember?

A. Why, it was kind of an ordinary package; it might have been a pound—I would not say how much was in it.

X Q. 92. Did you use any other kind of washing powder?
A. No, sir.
X Q. 93. Just that one brand?
A. Yes, sir.
X Q. 94. Did you ever see any borax in packages?
A. I do not think I ever did.
X Q. 95. After you left the Eustis house in 1914, I believe you said, where did you go?
A. I went North, Ohio.
X Q. 96. And when did you go back to Florida again?
A. 1921; that is, 1920.
X Q. 97. For the packing season of 1920-1921?
A. Yes, sir.
X Q. 98. And you looked up Mr. Robinson and he gave you a job?
A. Yes, sir. I did not look him up because they wrote to me to come down.
X Q. 99. And that was at New Smyrna?
A. Yes, sir.
X Q. 100. And you did not know whether they were using borax there or not?
[fol. 434] A. I could not say.
X Q. 101. Do you know whether Mr. Robinson was using anything in his wash tank at New Smyrna?
A. I could not say.
X Q. 102. Or at any of the other places that you worked with him, you do not know what he did?
A. No, sir.

Redirect examination.

By Mr. Neave:

R. D. Q. 103. You have spoken of this washing powder being in packages and you said it was Rub-no-more washing powder; what makes you think it was Rub-no-more; why do you think it was Rub-no-more?
A. That was on the package.
R. D. Q. 104. Did you ever put anything in the tank there at Eustis except oranges and this washing powder?
A. I beg your pardon?

R. D. Q. 105. Did you ever put anything into the tank there at Eustis, except the water and the oranges and this washing powder?

A. No, sir.

ARTHUR R. McCORKLE

ARTHUR R. McCORKLE was called as a witness in rebuttal on behalf of the plaintiff, and, having been duly sworn, testified as follows:

Direct examination.

By Mr. Neave:

I live at New Smyrna, Florida. I am fifty-three years old. I have lived in New Smyrna since 1904. My present occupation is with the Bond Lumber Company. I have been with that company for two years.

[fol. 435] When I went to New Smyrna in 1904 I went to work for Mr. B. F. Chilson, Ronnoc Grove. I did grove work in the summer, and I worked in the packing house in the orange grove or field. At that time it was the only house there and was known as the Home Packing House. Later there was another packing house there. The name of the other packing house was the Jungle.

The property known as the Ronnoc Grove comprised three different groves. They were known as the Home Grove, Osceola Grove and the Jungle Grove. There was no packing house at the Osceola Grove.

At the Home Packing House, where I was working when I started in, the fruit was not washed before it was graded and packed. A washer was afterwards put in there. I think that washer was put in in 1907. The washer was what we call a Warner washer. Before that washer was put in we did not wash the fruit in any way at all. We just took it as it came from the tree and packed it. After the washer was put in, at times in the morning when we first started, several of us would get around and help wash it and get going and we had regular help that operated the washer.

The Warner washer was a metal cylinder that revolved in a tank of water and sponges. The cylinder was open at

both ends and the fruit went in at one end and with a spiral in it and the oranges were dumped in with sponges and the spiral brought them out at the other end.

We fed sponges in with the oranges in about in equal parts to take off this mold which was caused from white fly; a crate of sponges and a crate of oranges about the same amount. The cylinder, I think, was about eighteen inches or something like that in diameter and either seven or eight feet long.

At that time the grove was small and there was a man by the name of Cartledge and he was known as the foreman there. Mr. Chilton was superintendent and he looked after [fol. 436] things himself. We did not really have a foreman.

Later I was made foreman, I think in 1907, and continued as foreman until 1911, when I left the company. I worked at the Jungle Packing House for a while.

The man that operated the Jungle Grove left in the spring of 1911 and I went out and took his place and I operated the rest of that season and in that fall I left the company. The man who had been operating that house and who left was Mr. L. D. Niles.

The Jungle Packing House and the Home Packing House I think were about a mile and three-quarters or maybe two miles apart.

During the time that I was foreman at the Home Packing House, I sometimes worked at the Jungle Packing House. When we were not running heavy, I would take my graders and packers and go over and help them, maybe a week or ten days, no certain amount of time; we went when we were needed.

Mr. Niles left in the spring of 1911. The season's pack was not completed at the time Mr. Niles left. I went immediately into the Jungle house at that time as foreman.

Mr. Niles was foreman for the north half of the groves and operated the packing house. The Jungle grove was divided into two parts. And he was foreman over the north half and the packing house. There was no packing house on the south half. They were using a Warner washer over at the Jungle house while I was there.

In the Warner washers at both the Home and Jungle houses there was something like two feet of space between

each end of the tank and the drum. When I would go from the Home house to the Jungle house to work from time to time, I would take my men with me. While I was [fol. 437] packing at the Jungle at those intervals while I was still foreman at the Home house, I was under instructions from Mr. Niles.

I knew Henry Clifton at that time. He was working with Mr. Niles in the packing house. As far as I observed Mr. Clifton's work, when we were there he operated the engine and packed, he would start and stop the engine and pack the fruit.

I knew Shady Manning around there at that time, I never saw him work in the Jungle packing house either when I was foreman of the Jungle packing house or when Niles was foreman. He was field foreman for his part of the grove and then when it came to picking season he supervised all of the picking. His part was the south end of the Jungle grove.

Shady Manning was never foreman of the Jungle packing house while I was employed at the Ronnoc grove. Shady Manning never worked at the Home packing house while I was at Ronnoc Grove.

Mr. Henry Clifton operated the engine while I was foreman at the Jungle packing house. Mr. Parrott, I believe, looked after the washer while I was foreman at the Jungle packing house. I finished the season at the Jungle house after Mr. Niles left and stayed then until in the fall of 1911.

I knew Gilbert Ballantyne. He was foreman for Mr. W. S. Hart. Hart's Grove was about a mile or mile and a half south of the Ronnoc Grove.

I knew Mr. Ballantyne personally for a year or two and then they came to our grove and operated the Home packing house for two or three weeks; I am not positive how long he did operate it.

I was not in the packing house at that time but in the summer I was foreman of the nursery and they were putting in 150 acres of grove and I was superintending the digging of these nursery trees. The time that I was doing this work and that Mr. Ballantyne was at the Home packing house was, I think, in February or March, 1907. I am [fol. 438] not positive as to the time.

Q. 77. During the time from 1904 to 1911 that you worked in the Home packing houses, what was put into the soaking tank besides oranges and water?

A. We did not use anything. Perhaps at some times we used washing powder or Pearline. Some call it Gold Dust and some call it washing powder.

Q. 78. Did you use some kind of washing powder all the time or at intervals?

A. We used it when the oranges were dirty and looked as though they needed it.

Q. 79. After you became foreman at the Jungle packing house, what was used in the washing water?

A. We used a little sometimes, the same washing powder.

Q. 80. Was there any other material put in there at any time while you were there?

A. No, sir.

Q. 82-83. Either at the Jungle packing house or the Home packing house, did you while you were there, ever hear of any other substance being put in the wash water?

A. No, sir.

Q. 85. Did you or did you not ever sprinkle any chemicals of any kind around the bins in either of these packing houses?

A. No, sir.

Q. 86-87. Did you or did you not ever hear of any chemicals being sprinkled around the bins while you were at the Home or Jungle?

Cross-examination.

By Mr. Morton:

X Q. 8. When did you start work at the Home Grove?

A. 1904.

[fol. 439] X Q. 89. In 1904?

A. Yes.

X Q. 90. Did they have a washing machine there at that time?

A. No, sir.

X Q. 91. Neither at the Home Grove or the Jungle Grove?

A. No, sir.

X Q. 92. When did they have a washing machine first put in at the Home Grove?

A. I think it was put in in 1907.

X Q. 93. And when was it put in at the Jungle Grove?

A. I do not remember what year it was put in there.

X Q. 94. Several years after?

A. Yes.

X Q. 95. What sort of work did you do when you first started in?

A. I worked in the grove in the summer and in the packing house in the winter.

X Q. 96. In the packing house what did you do?

A. Grade, packed, nailed up or anything that would come along.

X Q. 97. In what condition was the fruit when it came into the packing house?

A. The first two years we did not have to wash, it was nice, clean, pretty fruit, but after the white fly came, it was necessary to wash.

X Q. 98. Where was the washer?

A. The washer was set right outside of the building and as the drier went, it was brought inside off the drier.

X Q. 99. That is, the washer was outside of the building?

A. Yes, sir.

[fol. 440] X Q. 100. And this drier, what sort of a thing was it?

A. Made of slats about two inches wide and there was a space around as wide as the slats made so that the air could pass through. We had no means of drying only in the sun and air.

X Q. 101. How did the fruit get from the washer to the drier?

A. It was picked up in a pail or by hand and put from the washer on the drier.

X Q. 102. Did it run down the drier, was this slatted arrangement inclined so that it sloped?

A. Yes, sir.

X Q. 103. About how long was that?

A. It must have been twenty-five or thirty feet right down the side of the building and sloped so that they would run away.

X Q. 104. Then when they were dried out in the sun or in the air, they were taken in a basket or something and carried into the house?

A. Yes.

X Q. 105. Is it not true that the packers inside of the house had nothing to do with the washing of the fruit outside of the house?

A. Well, in a sense it was, but often we all worked at the washer—I say all, but a bigger portion of them worked at the washer and helped to wash the fruit, but we had a very slow process of drying and we had to wash and dry when we could and we had to use the help an-where at all.

X Q. 100. Were you not head packer there, was not that your title?

A. Yes.

X Q. 107. And you had the people inside the house under your charge packing the fruit?

A. After I was made foreman.

X Q. 108. And before that you were just a packer?

[fol. 441] A. Just a packer.

X Q. 109. Not head packer, but just a packer?

A. Yes, sir.

X Q. 110. When you were foreman you were foreman inside of the house and in charge of the packers, is that right?

A. I had charge of the whole thing, grading, packing and washing as well.

X Q. 111. What did Mr. Chilton do?

A. Mr. Chilton, of course, was manager over the whole thing.

X Q. 112. When you were packing fruit, when did you get to be foreman as you call it?

A. 1907.

X Q. 113. Is that when the washer was first put in?

A. I think the first season we had the washer.

X Q. 114. And you were made foreman?

A. Yes.

X Q. 115. Who had charge of the washer?

A. A colored man or a couple of colored men that operated it.

X Q. 116. Just what does anyone do when they operate the washer?

A. They put the fruit in and take it out.

X Q. 117. Did they not do that all the time while you were packing the fruit?

A. No, not all the time. If we needed those men for anything else we used them for anything that would come up. They did not do that alone. Anybody could operate that washer. There was nothing but what anybody could do.

X Q. 118. All you had to do was to put the fruit in and take it out?

A. It had to be run at a certain speed and it ought to be fed in a certain way and not too fast and not rushed through [fol. 442] or anything like that. We could give one man instructions as good as another.

X Q. 119. Who was in charge of the Jungle Grove before you went over there?

A. Mr. Manning was foreman over one end of it and Mr. Niles was foreman over the other when I went there.

X Q. 120. In 1907 who was in charge of it?

A. Mr. Manning.

X Q. 121. He was in charge of the whole thing then?

A. At that time there was no packing house.

X Q. 122. Who was in charge before Mr. Niles went there and after they had a packing house?

A. I think Mr. Niles was the first man who ever operated it to the best of my recollection.

X Q. 123. Insofar as you know he is the first man that ever operated any packing house on the Jungle Grove?

A. Yes, sir.

X Q. 124. And you do not remember what went on before that?

A. The first season that house was built, it was built in the summer of 1907 I guess, and that was when the oranges froze about Christmas. So there was not anything put up at that time.

X Q. 125. The washers were put in at the Home Grove and the Jungle Grove at the same time?

A. No, I do not think they were. Probably they were.

X Q. 126. You do not remember anything about that, do you?

A. No, I am not positive about that.

X Q. 127. You worked in that Jungle house before Mr. Niles was there?

A. No.

[fol. 443] X Q. 128. Where were the supplies kept at the Home Grove, did they have a store-room?

A. What do you mean by supplies?

X Q. 129. Paper for the wrapping of fruit and washing powder, if you had any, or whatever you had?

A. We had upstairs where the box material was and paper and different things was kept.

X Q. 130. And you had a store-room?

A. Yes.

X Q. 131. Was that store-room kept locked up?

A. No.

X Q. 132. How much of your time did you spend in the house and how much of it did you spend out of the house when you were head packer at the Home Groves?

A. I spent all of my time practically in the house.

X Q. 133. Do you remember a conversation at the packing house at New Smyrna about October 31, Sunday, with Mr. Pilkington of the American Fruit Growers at which I was present?

A. Yes, I remember the time.

X Q. 134. Do you remember telling us at that time that you were head packer and worked mostly in the house and did not know very well what was done about washing fruit?

A. I do not know that I told it just that way.

X Q. 135. Did you tell Mr. Pilkington that the washing was done by Gus Taylor, and that he ought to know what was done?

A. I said he done most of it.

X Q. 136. And that he ought to know what was done and that you did not know?

A. No, I do not think I said I did not know. I said that it was a long time and it was not fresh in my mind as to just what I had done.

[fol. 444] X Q. 137. Did you say that you were mostly in the house and did not know what was done and that it was not your business and that Gus Taylor ran the washer and ought to know what was done?

A. When we speak of in the house, we mean that the washer—that is in connection with the house.

X Q. 138. Did you not say that the washer was outside of the house and that you were working inside of the house packing the fruit?

A. Yes, but as I say that would be termed a part of the workings of the house.

X Q. 139. Did you not say that Mr. Chilton personally directed all the work, kept close supervision of it, and that you merely had charge of the packing of fruit inside of the house?

A. No.

X Q. 140. You did not say that?

A. No, sir.

X Q. 141. Do you remember saying at that time that you know something was used in the washer, but you did not remember just what it was or how much it was?

A. Nothing other than washing powder.

X Q. 142. Do you remember saying that you did not know what it was?

A. I said I did not know how much.

X Q. 143. Do you or do you not remember saying that you did not know what was used in the washing machine but that something was and you did not know how much was used or what it was?

A. I believe that I told that once or twice we used some bluestone when Mr. Chilton done that for samples and tried it in wash tubs. We just tried that two or three times to the best of my recollection.

The Court: Do you want the answer to stand or do you want it to go out?

[fol. 445] By Mr. Morton:

X Q. 144. Do you or do you not remember at that time telling Mr. Pilkington at this interview on October 31, that you did not know what was used in the washing machine and it was not your business to run the washer and that something was used and that Gus Taylor ran the washer and ought to know about it?

A. No, sir, I do not think I told you that.

X Q. 145. You do not recollect telling us that?

A. No, sir. When I was foreman there I would certainly have known what he put in.

X Q. 146. Did you not tell us that you were foreman inside of the house and Mr. Chilton carefully supervised and closely supervised everything and directed the washing himself?

A. No, sir, I did not. He supervised the whole thing but when I was foreman he looked to me to operate that washer just the same as he did the packing or any other part of it.

X Q. 147. If you had responsibility for this washing machine, why is it that you did not know how much washing powder you used?

A. Well, I mean Mr. Morton, I just don't remember at that time the amount that was used in it, that is what I had reference to. I did not remember the amount we used. It has been so long I did not remember the amount.

X Q. 148. Do you remember the amount now that you used?

A. I do not know that I could positively state now the amount that was used.

X Q. 149. Do you remember how often you used it?

A. We put it in every day.

X Q. 150. You do not know how much you put in?

A. I could not say what was the amount.

X Q. 151. What sort of washing powder was it?

[fol. 446] A. It was a stuff like the average Pearline, in small packages like we have today.

The Court: What?

The Witness: In small packages like we have today.

X Q. 152. You did not put anything in the washing machine that came in bulk?

A. No, sir.

X Q. 153. Are you sure of that?

A. I am positive we did not.

X Q. 154. Don't you remember telling us that there was a can, that you remember seeing a can around the washer that was used to scoop things into?

A. No. We used that out of the package, we poured it out of the package into the tank. We did not have any can.

X Q. 155. You did that every day?

A. Yes, sir.

X Q. 156. What other brands of washing powder did you use in the tank?

A. We never used anything but one brand.

X Q. 157. This Pearline—never used Gold Dust or anything like that?

A. (No reply.)

Mr. Neave: Was that a question, Mr. Morton?
Mr. Morton: Yes.
Mr. Neave: Read the question, Mr. Smart.

(X Q. 157 repeated as recorded.)

A. No.

Mr. Morton: That is all.

[fol. 447] Redirect examination.

By Mr. Neave:

R. D. Q. 158. You have said that Chilton was manager over or supervised the whole thing; what Chilton was that?

A. B. F. Chilton.

R. D. Q. 159. When you speak of him as manager over or supervising the whole thing, what do you mean by the whole thing?

A. I mean the grove, in every particular he was superintendent over the grove works, and the packing house, every part of it.

R. D. Q. 160. That was the Home Grove?

A. The Home Grove, Osceola and the Jungle.

R. D. Q. 161. Three groves?

A. Yes, sir.

R. D. Q. 162. How continuously were the Jungle and the Home Grove packing houses operated?

A. Well, at sometimes they would operate one and would not operate the other, owing to the markets, and sometimes they would operate both at the same time.

R. D. Q. 163. Do you remember what the output was, the daily output of those houses?

A. No, sir, it was a very small amount. We handled fruit in different way to any other packing house I ever saw and it was a very slow process.

R. D. Q. 164. What was the different way; what did you have in mind when saying it was a "different way"?

A. Every orange was handled by hand and all the little specks and scale and everything that was not washed off

was scraped off with a little pointed stick and the grader had to pick up every orange. He handled it several different times.

R. D. Q. 165. When was this handling, before the fruit [fol. 448] went into the washer or after the fruit came out of the washer?

A. No. It was taken off this drier by hand and put in bins and then the graders looked over it and rolled it from there into a sizer.

R. D. Q. 166. How did you cull your oranges, do you know?

A. They culled very, very close.

R. D. Q. 167. Very what?

A. Close.

R. D. Q. 168. You have spoken of this washer that was just outside the wall of the packing house of the Home Grove?

A. Yes, sir.

R. D. Q. 169. Now, where was the washer at the Jungle Grove?

A. Well——

R. D. Q. 170. Was it inside the house or outside the house?

A. It was put outside, the same as the other.

R. D. Q. 171. Where did Gus Taylor work in the Home Grove or Jungle Grove or both groves?

A. Sometimes at both.

R. D. Q. 172. What kind of a job did he have?

A. He was a teamster; when the house was not running he was teamster.

R. D. Q. 173. He was a Negro, was he not?

A. Yes.

R. D. Q. 174. Who succeeded you as foreman of the Jungle Packing House?

A. Mr. Clifton, Henry Clifton.

R. D. Q. 178. What is the name of this son, do you remember his name?

A. Kirby Chilton.

R. D. Q. 179. Was it Kirby Chilton whom you were talking to when you were talking to Mr. Morton and Mr. Pilkington recently?

A. Yes, sir?

[fol. 449] WILLIAM H. CURTIS

WILLIAM H. CURTIS was called as a witness in rebuttal on behalf of the plaintiff, and, having been duly sworn, testified as follows:

Direct examination.

By Mr. Neave:

I live in Dania, Florida. I began work at Ronnoc Groves in 1908. I remained there till 1914. I first went to Ronnoc Groves in 1908. I worked in the groves as a laborer. I was working all over the Jungle Grove.

I know Mr. L. D. Niles. I first met him in 1909 at Ronnoc Grove.

When Mr. Niles came I went in the house, in the packing house of the Jungle Grove. When I first started there I helped wash and helped pack any fruit and helped start the engine. There was a Warner washer there. Mr. Niles was the foreman of the Jungle packing house when I began working there. Mr. Niles remained there till 1911 sometime.

Mr. McCorkle then became foreman of the Jungle packing house. He left the same year he came. Then I became foreman of the Jungle house. I remained in that position until 1914.

The work I did on the washer was to put in oranges sometimes and to take out some, when there was a man short I filled in any place that was necessary.

The soaking tank was dumped once a week, as I remember. Sometimes I attended to the dumping of the water. I also had to do with putting fresh water in. I put sponges in the washer in addition to oranges and water.

Q. 35. Did you ever use anything else?

A. Yes, sir.

Q. What?

A. Soap powder.

[fol. 450] Q. 37. What kind of soap powder?

A. Gold Dust, Pearline.

Q. 38. How often did you use soap powder?

A. Well, we usually when we started up to wash the fruit, we dumped in some then. As the water got down low from dipping the oranges and sponges out the water would disap-

pear from the tank during the day as we added water we would dump a little more in.

Q. 39. State whether or not you ever put in anything other than the Gold Dust?

A. No.

Q. 40. State whether or not you ever used any borax in the water there at the Jungle house?

A. No, sir.

Q. 41. State whether or not you ever heard of any borax being used in the soaking tank of the Jungle house?

A. I did not.

Q. 42. State whether or not you ever sprinkled any borax water or any other chemicals around the bins?

A. No, sir.

Q. 43. And state whether or not you ever heard of borax or other chemicals being sprinkled around the bins?

A. I did not.

Q. 44. Do you know Shady Manning?

A. Yes, sir.

Q. 45. What was he doing when you knew him?

A. When I went there?

Q. 46. Yes.

A. He was field foreman.

Q. 47. Of what?

A. Of the grove; the orange grove.

Q. 48. Of the Jungle?

A. Jungle Grove.

[fol. 451] Q. 49. And as time went on and you stayed there longer, what was Manning's position?

A. He was field foreman right on as long as I was there, he was.

Q. 50. Was he one of the men working in the packing house with you?

A. No, sir.

Q. 51. State whether or not he ever worked in the packing house while you were?

A. Not when I was there.

Q. 52. Was he ever foreman of the packing house while you were there? Did he have anything to do with the machinery while you were there?

A. Yes, he ran the engine some.

Q. 53. The engine in what house?

A. In the Jungle Grove.

Q. 54. Mr. Clifton, you said that Manning ran the engine?

A. Yes, sir.

Q. 55. What was the engine doing; what was the engine running for when he ran it?

A. It was sawing wood.

Q. 56. State whether or not Manning was still in Ronnoc Grove when you left?

A. No, sir.

Q. 57. Do you remember how long he had left before you left there?

A. I went away in 1914 and he went away—I do not remember—quite a little while before I did.

Cross-examination.

By Mr. Morton:

X Q. 58. Where did you go when you left the Ronnoc Groves?

A. From what time?

X Q. 59. When you left Ronnoc Grove?

[fol. 452] A. I do not remember where I went.

X Q. 60. What else did the engine run beside the wood-cutting machine?

A. The washing machine.

X Q. 61. Did it run any other part of the packing house machinery?

A. No, sir.

X Q. 62. Everything about the packing machinery except the washing machine was run by hand?

A. There was no other machinery there besides that sizer which was run by a foot pedal.

X Q. 63. That is all the machinery there was?

A. Yes.

X Q. 64. And the washer and engine were outside of the house?

A. Under a shed.

X Q. 65. But outside of the packing house proper?

A. Yes.

X Q. 66. Everything else was inside of the packing house?

A. The wood sawer was outside.

X Q. 67. I mean all the orange handling machinery, whatever you had, was inside of the house except the washer?

A. And the drying rack where we put the oranges after taking them out of the washer.

X Q. 68. You were there before Mr. Niles came?

A. I was there in 1908.

X Q. 69. What was Mr. Manning doing then?

A. He was field foreman of the whole Jungle Grove.

X Q. 70. He was head of the whole Jungle Grove at that time?

A. Yes, sir.

X Q. 71. And who washed the fruit then?

A. When Mr. Niles was there?

[fol. 453] X Q. 72. No. Before Mr. Niles?

A. I do not think there was any to wash. There was only a few and they were sent to the Home Grove.

X Q. 73. There was not any washing machine there until Mr. Niles went there?

A. I think it was fitted up before he went there. I do not think they ever used it, just to put up some sample packages.

X Q. 74. That is the best of your recollection on that?

A. Yes, sir.

X Q. 75. That there was no washing done until Mr. Niles went there?

A. Not that I know of.

X Q. 76. What was done with the fruit from the Jungle Grove?

A. It was sent to the Home Grove packing house.

By the Court:

Q. 77. What else did you put in your wash water besides Gold Dust, did you say?

A. Sponge and oranges. There were two kinds of powders, Pearline.

Redirect Examination.

By Mr. Neave:

R. D. Q. 78. You have just said that the washer was in a shed on the outside of the packing house?

A. Yes, sir.

R. D. Q. 79. Where was the engine?

A. It was in a little room right back, under this same shed, only there was a partition between the washer and the engine.

(Witness excused.)

[fol. 454] LELAND D. NILES

LELAND D. NILES was called as a witness in rebuttal on behalf of the plaintiff and, having been duly sworn, testified as follows:

Direct examination.

By Mr. Neave:

Q. 1. Where do you live now, Mr. Niles?

A. At Haines City, Florida.

Q. 2. What is your occupation now?

A. Fruit Grower and Advisor on Horticulture.

Q. 3. When did you go to Florida?

A. In the latter part of April, 1909.

Q. 4. How old were you then?

A. About thirty-eight years old.

Q. 5. What was the nature of the experience that you had previously had?

A. Before going to Florida?

Q. 6. Before going to Florida?

A. General agricultural and fruit growing.

Q. 7. Where?

A. I was raised in Iowa, also had experience in Nebraska and Minnesota. In Minnesota I was at the experimental station under the direction of the Chief of the Division.

Q. 8. What experimental station was that?

A. The Minnesota State Experimental Station at St. Paul.

Q. 9. Before going to Florida, what was the nature of the experience which you had had with citrus fruits?

A. Absolutely theoretical and not practical.

Q. 10. You said you went to Florida in April, 1909. How soon thereafter did you become connected with any business enterprise there?

A. During the summer of 1909.

Q. 11. With what concern did you then become connected?

[fol. 455] A. Ronnoc Groves.

Q. 12. On going to Ronnoc Groves, to whom did you report?

A. Benjamin F. Chilton.

Q. 13. What was his position there?

A. Mr. Chilton was Florida manager for Washington E. Connor.

Q. 14. To what work were you then put?

A. The first work?

Q. 15. The first work, yes.

A. The first work I made a detailed map of the Jungle Grove.

Q. 16. Was that one of the Ronnoc Grove properties?

A. Yes, sir.

Q. 17. Were there any other groves in those properties?

A. Ronnoc Grove property consisted of three orange groves.

Q. 18. What were the names of the three?

A. The oldest one was the Home Grove, which was located near the general offices in New Smyrna, and than as I understood the next planting was at the Jungle Grove, about 125-acre grove, possibly a mile and a half west of New Smyrna, and the young planting was called Osceola Grove.

Q. 19. How many packing houses were there on those properties?

A. Two.

Q. 20. And where were they located with respect to those three groves?

A. The old packing house, which was the one Mr. Chilton always called No. 1, was at the Home Grove, near the general offices, and the new packing house, which he called No. 2, was located at the Jungle Grove.

Q. 21. You said that your first work there was in making a map. How long were you on that work?

[fol. 456] A. That took me quite a little while. I would say over two months.

Q. 22. Then what work did you take up?

A. Well, in that work of making that platting of the grove we found many vacant spaces, and I think the next

work was they gave me a small crew of men and I replanted the trees.

Q. 23. What was the orange-picking season in that part of Florida?

A. Very few would be picked, depending somewhat on the season. I would say in September, and that would run on through the season until later the Valencias, as we call them now, which might extend until April.

Q. 24. What did you do next after working on the trees in the groves?

A. Well, possibly some different things in the grove, but soon after that I went to the Hart's packing house.

Q. 25. How far away was Hart's packing house?

A. Why, that was located at Hawk's Park, which is just a short distance, possibly a mile or a mile and a half from New Smyrna.

Q. 26. While at Hart's Grove in whose employ were you?

A. Still with Ronnoc.

Q. 27. And under whose instruction did you go to Hart's Grove?

A. Mr. Chilton.

Q. 28. What instructions did he give you?

A. Well, he told me to report to W. S. Hart at Hawk's Park, at his grove, and to try and learn every detail of his method of packing and handling fruit.

Q. 29. When did you go to Hart's packing house?

A. You mean when, the month?

Q. 30. About the month and the year?

[fol. 457] A. The first fruit he packed in that season, I should judge during November.

Q. 31. Of what year?

A. That would be 1909.

Q. 32. And how long did you remain at Hart's packing house?

A. I have no record, possibly a month.

Q. 33. What were you doing while there?

A. I performed every operation of picking and packing, all the different details through the house up to shipping the fruit.

Q. 34. What machinery was then used in the Hart packing house?

A. Only the washer was run with an engine; the sizer was run with a foot-treadle.

Q. 35. And what kind of a washer was it?

A. A Warner washer, a flat one.

Q. 36. Now, will you describe that Warner washer in not great detail, but generally, so that we can recognize it?

A. Well, the principal part of the Warner washer consisted of a drum or cylinder which would be placed in a tank and this cylinder revolved in that tank from machinery which derived its power from a small gasoline engine.

Q. 37. How were the oranges fed into the Warner washer?

A. They were placed there by the operator picking each orange up individually or two at a time, and placing them in the water, watching very careful, you understand, in regard to culling fruit. That is, looking for damaged or injured fruit, or fruit with long stems.

Q. 38. And when it came to the fruit with the long stems or any damaged or injured fruit, what would he do with it?

A. Cull them.

Q. 39. Throw it aside?

[fol. 458] A. With a long stem, frequently he would have a pair of clippers and recut the stem.

Q. 40. You said that that cylinder of this Warner washer ran in a tank; what was in the tank?

A. The machinery that held the cylinder up from the bottom of the tank and the mechanism of operating that cylinder and revolving it; is that what you mean?

Q. 40a. Was there anything put in the tank?

A. Oh, certainly, water.

Q. 41. And how high did the water come up in the cylinder?

A. Well, it would come up well towards the top on the inside of the cylinder, never quite to the top of the cylinder.

Q. 42. And what did you do with this washer while you were at Hart's packing house?

A. Why, I helped to operate it.

Q. 43. How often was the water changed?

A. After each lot of fruit, the water would be drained from the tank and the next time fruit was washed, why they would put in fresh water. Could I add a reservation there?

Q. 44. Surely.

A. In listening to this testimony some things appear to me not quite clear. You must understand this fruit was handled in a very small way. That is, small amounts. We

might go out and pick a small quantity of fruit, enough to make 20 or 50 or 60 boxes or something like that, and that fruit would be brought in and the first operation would be washing it. Well, that washer might not be operated again for two or three days, possibly twice a week in some way. It was not a continuous operation as the commercial houses are doing nowadays.

Q. 45. And when the washer was to be used, what was there that was placed in the tank in addition to water and oranges?

[fol. 459] A. Sponges.

Q. 46. What were the sponges there for?

A. Well, for two purposes. One to help clean the fruit if necessary, and the other to prevent its bruising.

Q. 47. Was anything else placed in the water besides the oranges and sponges?

A. No, sir.

Q. 48. After remaining at Hart's packing house a month, I think you said, what did you then do?

A. I returned to the Jungle Grove.

Q. 49. Was the Jungle packing house then open?

A. No, sir.

Q. 50. When did it open?

A. Shortly. Within a few days after I was there.

Q. 51. Who had charge of opening the Jungle packing house?

A. I did.

Q. 52. What did you have to do with the operation of that packing house after it was open?

A. I had full charge of it.

Q. 53. How long did you continue in that position there?

A. Through two seasons. I stayed there until the spring of 1911.

Q. 54. What kind of a washer was there at the Jungle packing house?

A. A Warner washer.

Q. 55. Was it just like that at Hart's?

A. With the exception that the tank that held the water was smaller than at Mr. Hart's. The washer part was the same.

Q. 56. And at the Jungle packing house while you were there, what did you put in the water, or what was put in the water other than oranges and sponges?

A. Under my direction, we never put anything in the water until possibly the last month that I was there in 1911.

[fol. 460] Q. 57. And then what did you put in?

A. Well, the white fly began to come into the Jungle Grove and we used a little bit of washing powder.

Q. 58. Washing powder?

A. Yes, sir.

Q. 59. Did you remember what kind?

A. As I remember it was Pearline, I think it was.

Q. 60. State whether or not you ever used any other chemicals in that washer?

A. In the washer?

Q. 61. Yes.

A. In a commercial way?

Q. 62. Yes.

A. No, sir, never did.

Q. 63. Do you know when it was that stem end rot first appeared in Florida?

A. The first that I remember, the Government boys working on that was in that first winter that I was in Florida, then at the Horticultural meeting the next summer, they read papers, and the following winter they followed the work up.

Q. 64. During the operation of the Jungle packing house while you were there, how did the culls run; high or low?

A. Very high. We culled very closely.

Q. 65. Do you know Manning?

A. You mean Shady Manning?

Q. 66. Yes.

A. Yes.

Q. 67. When did you know him?

A. At the Jungle Grove.

Q. 68. Was he there when you first went there or did he come afterwards?

A. He was there.

Q. 69. How long did he remain there?

A. He was there when I left.

[fol. 461] Q. 70. What did he do there during the time you were there?

A. When I first went out to Jungle Grove he was timekeeper and in charge of some work in the grove.

Q. 71. What kind of work in the grove?

A. General grove work. That is, hoeing and working on trees.

Q. 72. State whether or not he worked in the packing house while you were there.

A. No, sir.

Q. 73. State whether or not while you were there he had anything to do with the machinery in the packing house.

A. No, sir; he did not.

Q. 74. And state whether or not he was foreman of the packing house while you were there.

A. No, I was foreman.

Q. 75. Did you ever work at Ronnoc Grove after the spring of 1911?

A. No, sir.

Q. 76. When you left, do you know who it was that took your place in the Jungle packing house?

A. Yes, sir.

Q. 77. Who was that?

A. Arthur McCorkle?

Q. 78. Is that A. L. McCorkle?

A. I always knew him by Arthur. This is the gentleman who just testified here.

Q. 79. Did you know William H. Clifton?

A. Yes, sir.

Q. 80. Who is he?

A. Henry Clifton worked with me the two years I was at the Jungle.

Q. 81. After you left the Ronnoc Groves in the spring of 1911, what work did you then take up?

A. Development of large citrus properties.

Q. 82. In Florida?

[fol. 462] A. In Florida; yes, sir.

Q. 83. Are you a member of the State Horticultural Society?

A. Yes, since 1909.

Q. 84. Ever been an officer of that society?

A. Yes, sir.

Q. 85. What offices have you held there?

A. I have been a member of the Executive Committee—I do not remember the records—eight or ten years the treasurer of the society, succeeding Mr. W. S. Hart up until the 1st of January, 1927.

Q. 86. At the Jungle Grove, where was the washer located?

A. The washer was on a platform east of and outside of the building.

Q. 87. I have been speaking in asking you questions here about the Jungle packing house. What have you understood that I included in the word "packing house"?

A. I do not just get your question.

Q. 88. I have been speaking of "packing house." What have you understod that I included in the word packing house in asking you the questions?

A. I consider everything connected with the operation of the house.

Q. 89. Where was your work at the Jungle packing house?

A. I had charge of the operations of the whole of the house.

Q. 90. How much did your work take you out where the washer was?

A. I was responsible entirely for the operation of the washer. The same as the other parts of the house.

Q. 91. While you were at Ronnoc Groves, will you state whether or not you used in any way any chemicals in connection with citrus fruits?

A. Are you speaking commercially?

[fol. 463] Q. 92. No.

A. Or experimental work?

Q. 93. Did you ever use it commercially?

A. No, sir.

Q. 94. Now, experimentally, did you?

A. Yes, sir.

Q. 95. What chemicals did you use?

A. Can I refer to my notes?

Q. 96. Oh, certainly.

A. Do you want the list?

Q. 97. Yes, if you will give us a list of the chemicals you used.

A. Among other things were copper sulphate, Bordeaux mixture of various strengths, ammonia copper carbonate, formaline, sodium borate, permanganate of potash; iodine in combination with certain other materials to render it more soluble in water and to prevent a tendency to precipitation.

Q. 98. Sodium borate, that is borax?

A. Yes.

Q. 99. How did you apply these chemicals to the fruit?

A. Make a solution and dip them.

Q. 100. Will you explain that a little more in detail? Just give us a picture, if you can, of what your experiments were and how they were carried on and the scale on which they were carried on.

A. These experiments were carried on at a very small scale. I made a solution in a small vessel, holding a very small amount of water, and tried to get it worked out along certain lines and the fruit was dipped in the solution.

Q. 101. And what did you do with the fruit after you dipped it?

A. I set the fruit to one side for observation as to comparison and to note in regard to any anthracnose developing on fruit.

[fol. 464] Q. 102. Give me some idea of what anthracnose is; how does it manifest itself and what is it?

A. It is a fungus that develops upon citrus trees and various parts of the tree. It is called certain names, different names according to the part of the tree or fruit that it develops on and when it shows on the fruit is called anthracnose. With a tree or leaf it would be a different name.

Q. 103. Is it the same as green mold or blue mold?

A. No, sir.

Q. 104. Where did you get the fruit that you treated as you say experimentally?

A. Just a matter of comparison. I took the fruit from the packing bins.

Q. 105. At the Jungle Grove?

A. Oh, yes. That was the same fruit that we would be packing to ship.

Q. 106. And where are the packing bins with reference to the washer and drying?

A. At the other end. Fruit in the packing bins would be fruit that has gone through all of the operations of the house and would be the sound fruit ready to ship to the market.

Q. 107. What character of fruit did you take from these bins, did you make any selection?

A. I took the best.

Q. 108. As the result of these experiments, what did you observe as to the action of the chemicals on anthracnose?

A. Sometimes the material was too strong and ruined the fruit, of course, but of course this was in a small way and I did not observe any decided pronounced benefit.

Q. 109. State whether or not any one of these chemicals turned out better than any other so far as the effect on anthracnose was concerned?

[fol. 465] A. I always was of the opinion that iodine did the best.

Q. 110. State whether or not you observed any effect of these chemicals on blue mold or green mold?

A. To be frank with you I was not looking along that line, I would not expect it to have an effect on that for the reason that I picked the very choicest sound fruit from the bins.

Q. 111. Were you having trouble with blue or green mold?

A. Mr. Neave, we took extreme care in handling all this fruit and were not troubled to any extent with the blue mold.

Q. 112. Where did you make these experiments, in your home or in the packing house or out doors or where?

A. I had an office in the packing house at the south end and that is where they were made.

Q. 113. In what year did you make these experiments?

A. They were first made in the year 1909.

Q. 114. What part of the year do you recall?

A. It would be just at the latter part of December.

Q. 115. And how long did these experiments continue at that time?

A. I would say not over ten days.

Q. 116. State whether or not you again took up these experiments later?

A. I tried the iodine only.

Q. 117. And when did you do that?

A. That was in the winter of 1910.

Q. 118. And how long did you work on those experiments at that time?

A. A small number, I do not think more than four or half a dozen.

Q. 119. Did you again take up such work?

A. No, sir.

[fol. 466] Q. 120. Did you ever use Schnarr's Insecticide?

A. A great deal of it.

Q. 121. What was that used for?

A. That was used as an insecticide in killing insects in the grove.

Q. 122. Was it used in the fruit in the packing house or on the trees?

A. On the trees as a rule, but I also have heard of its being used in the water in washing.

Q. 123. What was it, was it a powder or an oily substance or liquid?

A. It is an emulsion made—it is supposed to be—I do not know if there was a patent on it, but it was a formula that Mr. Schnarr had.

Q. 124. Did you ever mix any of it with water?

A. Yes, sir.

Q. 125. And what appearance does it give?

A. It would give a rather milky appearance, according to the strength.

Q. 126. When you were there at the Jungle packing house, did you or did you not ever sprinkle borax water in and around the bins and through the house?

A. No, sir.

Q. 127. Did you ever see anything of that sort done?

A. No, sir.

Mr. Neave: That is all, Mr. Morton.

Cross-examination.

By Mr. Morton:

X Q. 128. What time did you say you went to the Jungle Grove first?

A. Do you mean in what year?

X Q. 129. What year?

A. 1909.

X Q. 130. What time of the year?

[fol. 467] A. I cannot give you the exact date, but it was in the summer time.

X Q. 131. When did you go to work there regularly?

A. In the summer or during that period of 1909?

X Q. 132. It was sometime before the fruit season opened?

A. The fruit was only partly grown.

X Q. 133. What was Mr. Manning's position before you went there?

A. I could not say before I went there.

X Q. 134. I do not suppose you took charge the day you arrived, but what position did you find him in when you got there?

A. Mr. Manning or Shady was time-keeper of the men at the Jungle Grove and in charge of some of the operations in the Grove.

X Q. 135. Who else was in charge of any of the operations there?

A. At the Jungle Grove?

X Q. 136. At the Jungle Grove?

A. There was only very few men there in the summer time; it was a very small crew.

X Q. 137. Is it not a fact that Mr. Manning was the resident superintendent or manager or foreman or boss, whatever you call it, of the Jungle Grove?

A. In the country I come from, we would call him the straw boss, that is, in this way, that he received his orders every morning in regard to anything that he was doing.

X Q. 138. He received his orders from Mr. Chilton?

A. Yes, sir.

X Q. 139. And he carried out everything that was done at the Jungle Grove, is that right?

A. Hardly as broad as that. Of course he was working under Mr. Chilton.

[fol. 468] Mr. Neave: Mr. Morton, may I ask at what time you are speaking of in that last question?

Mr. Morton: When Mr. Niles went there.

By Mr. Morton:

X Q. 140. Did you work in the grove or in the packing house when you went there first?

A. It was in the grove season. The first work that I did, Mr. Chilton said that Mr. Connor was very anxious—do you want me to tell you?

X Q. 141. Yes.

A. He said Mr. Connor was very anxious to get the groves in such shape that he could tell better in his New York office as to where certain varieties were and the general condition of the groves and he asked what experience I had and we

talked the matter over and he suggested making the detailed plan of the grove and he asked if I could make it, and I told him I would. That is the first work that I was set at when I went to the grove. I was not working under Shady then, if that is what you have reference to.

X Q. 142. You were working under whom?

A. Mr. Chilton.

X Q. 143. Had you moved to New Smyrna at that time?

A. Yes, sir. Living at the Jungle Grove.

X Q. 144. Did you have a house there or a cottage?

A. Yes, sir. This house of course was one of the company houses, it was opposite the packing house, concrete block house.

X Q. 145. When did you first have anything to do with the packing?

A. When I went to Mr. Hart's place.

X Q. 146. And about what time of the year was that?

A. It must have been during November. It was during November.

[fol. 469] X Q. 147. And how long prior to that was it that you went to New Smyrna?

A. The first time I went to New Smyrna was when I attended the Horticultural meeting held at Daytona, in 1909.

X Q. 148. That is the first time you went to New Smyrna. Do you know what time of the year that was?

A. It is a matter of record. It must have been in May.

X Q. 149. Do you remember coming back to Daytona, again at any time; I mean before you moved to New Smyrna?

A. Yes, sir.

X Q. 150. You lived at Daytona until you went to New Smyrna?

A. We had a cottage at Daytona Beach.

X Q. 151. When did the packing season start at the Jungle Grove?

A. I would say in September, with this reservation. I found in planning this Jungle Grove, making a detailed map, that in the entire grove we had some thirty-six varieties of citrus trees and among them were some young trees which is the earliest fruit to ripen and when I speak of packing, that would mean all of the fruit and would include the fruit that was picked on these young trees and sent per-

sonally to Washington E. Connor or friends of his in New York, not in a commercial way, but they would be packed just the same.

X Q. 152. When did the white fly strike the Jungle Grove section?

A. It caused very little damage there until the spring of 1911 at the Jungle. That is what you asked at the Jungle Grove?

X Q. 153. Yes.

[fol. 470] A. It was an isolated grove, it was back in the hammock and was not affected with the white fly as early as some of the others in that section.

X Q. 154. I call your attention to a photostat of two pages of manuscript writing and ask you to state whether or not it is your writing?

A. Yes, sir.

X Q. 155. Does that letter in any way refresh your recollection as to when you went to New Smyrna and when the white fly became serious at the Jungle Grove?

A. Entirely, because I did not have those dates. In regard to the white fly in that letter, the white fly was bad out on the river front and would be bad in the Home Grove or the old property but not in the Jungle property.

X Q. 156. After reading this letter, when would you say you went to New Smyrna?

A. My recollection is that it must have been immediately after.

X Q. 157. In October that you went there first?

A. I cannot give you the exact dates. The only way that I have to remember that was that I know the mosquitoes were very bad and it was very warm weather and that is the reason I said in the summer.

X Q. 158. When did you start in having any active connection with the packing of the fruit at the Jungle Grove?

A. It must have been during December of 1909.

X Q. 159. Now, how do you fix that time?

A. How do I fix that time?

X Q. 160. Yes.

A. For the reason that I went to Mr. Hart's place it must have been in November, and I was down there, as near as I recollect, it must have been close to a month, I cannot

say positive, of course, in regard to that, and that the house was opened after I came back from Mr. Hart.

[fol. 471] X Q. 161. There had been no packing of fruit prior to that time at the Jungle Grove?

A. Not in the Jungle Grove. There had been one or two wagon loads of fruit sent down to the Home Grove from the Jungle Grove, in the year 1909.

X Q. 162. Did you say there was no fruit packed at the Jungle Grove till prior to 1909, the fall of 1909, until you opened the house in December?

A. Not as I recall it.

X Q. 163. Had you any citrus fruit experience prior to your going to Mr. Hart's packing house, experience in the handling of citrus fruit prior to that time?

A. I had never been in Florida until the summer of 1909, so it was only theoretical.

X Q. 164. What sort of work were you engaged in Minnesota?

A. I was in the experimental station under Andrew Boss, chief of the division.

X Q. 165. What kind of work was it?

A. Well, I had done many things, routine work, had charge of some parts.

X Q. 166. Did it relate to grain or fruit or stock, or what?

A. Andrew Boss, the chief of the Division of Horticulture—can I answer—how do you mean the question? Do you mean what experience I had had?

X Q. 167. What was the nature of your work at Minnesota Experiment Station?

A. Agricultural, and I had a chance to observe the horticultural also, all at the same station.

X Q. 168. What kind of agricultural work were you engaged in? That is a rather broad field.

A. The Minnesota Station contains about 700 acres, largely experimental.

X Q. 169. Were you a stock man or a grain man?

A. I would say various——

[fol. 472] X Q. 170. Had you any horticultural experience before you went to Florida at all?

A. Yes, sir.

XQ. 171. What was it?

A. Along the line of apples, peaches and plums and small fruit, general fruits of the North.

XQ. 172. Had you any experience with packing fruits of that kind?

A. Not citrus, only theoretical.

XQ. 173. I show you a photostat of another letter, handwritten letter, and ask you to state if that is your handwriting?

The Court: Do you want the first one marked for identification?

Mr. Morton: Yes, sir.

(The letter L. D. Niles to W. E. Connor, of September 29, 1909, was received and marked "Defendant's Exhibit A for Identification.")

A. I call your attention to a reference there—Samuel D. Green.

XQ. 174. Does this letter in any way refresh your recollection as to the nature of your work at the Minnesota Agricultural Experiment Station?

A. It refreshes my recollection as to the way that I happened to write that letter to Mr. Connor.

XQ. 175. I asked you if it refreshed your recollection in any way as to the nature of your employment in the Minnesota Experimental Station?

A. Not necessarily, because I would know about that.

XQ. 176. I note it says here: "I am at present in charge of the live stock".

A. Yes, I had charge of the live stock which went to the exhibit of the International Show at Chicago in two seasons, and incidentally, I may say, we brought back a whole box of ribbons—prizes.

[fol. 473] XQ. 177. How long were you at the experimental station—more than two seasons?

A. No. I do not think so.

XQ. 178. And those two seasons, you had charge of the live stock?

A. Under Andrew Boss.

X Q. 179. Did you write this letter of which this is a photographic copy on or about the date March 24, 1909, to Mr. Connor?

A. I undoubtedly did.

X Q. 180. And did you write a letter marked for identification Defendant's Exhibit A for Identification to Mr. Connor on or about September 29, 1909?

A. That is the one you showed me?

X Q. 181. The first one?

A. Yes.

Mr. Morton: I offer those photographic copies in evidence.

The Court: Any objection?

Mr. Neave: I have no objection, but I do not know any reason why they should go in. I have no objection, however.

(The letter L. D. Niles to W. E. Connor of September 29, 1909, was received in evidence and marked "Defendant's Exhibit No. 44.")

(The letter from L. D. Niles to Hon. Washington Connor, March 24, 1909, was received in evidence and marked "Defendant's Exhibit No. 45.")

X Q. 182. What did Mr. Manning have to do with the fruit during the packing season when you were there?

A. Shady knew the varieties of fruit in the grove and knew where they were located. When I would receive an order in regard to packing, which would generally be a [fol. 474] typewritten list of the customers, the kind of fruit that customers would receive, some might want one being in the box and some another, and I would figure out what fruit I would need and instruct Shady to have it picked.

X Q. 183. Then when he had it picked, did not he haul it up to the house and wash it and put it on the drier rack so that it could be packed in due time?

A. Do you mean Shady personally?

X Q. 184. Under his direction in carrying out the orders that were given him?

A. No. That was not his business to do that. He was a cripple. He could not handle fruit that way, any way.

XQ. 185. Did not he direct that the pickers go to the proper trees to get the proper fruit and pack it in the field boxes or whatever they have and haul it up to the house and wash it and have it ready for the purpose of being packed?

A. No. You go too far there, Mr. Morton. No. My instructions were he could direct the pickers what to pick, as I had given him a memorandum. Then the fruit would be hauled to the packing house on the wagon with springs by some of the teamsters and unloaded on the washing platform, and on the wagon were men who handled the fruit with the crew in the house. Does that make it clear to you?

XQ. 186. Is it not true that getting the fruit ready for packing included the washing at the Ronnoc Grove houses, because the packing was all done inside the house and the washing was done outside, and because of your air drying it was necessary to allow an interval between the washing and packing?

A. Do I understand from that question that you mean that the man that was picking fruit outside had the responsibility of washing that fruit?

XQ. 187. Yes.

[fol. 475] A. You are absolutely mistaken.

XQ. 188. Who supervised the packing in the houses when you were there?

A. At the Jungle Grove?

XQ. 189. At the Jungle Grove when you were there?

A. I did personally.

XQ. 190. What else did you supervise?

A. I had full charge of the house.

XQ. 191. Did you have any charge of any of the groves?

A. Do you want me to tell you?

XQ. 192. I asked you if you had charge of any of the groves?

A. Yes, sir.

XQ. 193. What part of the grove?

A. To the best of my recollection, Mr. Chilton came out there one day and said under Mr. Connor's instructions that he was going to divide the grove, giving Shady the south part, he living on the south part, and Niles was to

have the north part, including the packing house and the crew of men were divided in that manner.

X Q. 193a. When was that done?

A. I could not give you the dates.

X Q. 194. How soon after you went there?

A. You must remember this is a long time ago and I have not the records.

X Q. 195. You were only there two years; was that done immediately after you went there or at a later time?

A. No. I have accounted for some little time after I went there.

X Q. 196. You said the packing house season started about the latter part of December, I believe, at the Jungle Grove?

A. As I recollect it; yes, sir.

[fol. 476] X Q. 197. Did this division of the grove occur about that time or at a later year, the following year, or when?

A. Oh, I think it was at the same time that the packing house was turned over.

X Q. 198. You mean in laying out, Mr. Chilton, in laying out your duties for that season, made a division like that?

A. He came out under those circumstances; I cannot give you the date.

X Q. 199. What was the reason you left the Ronnoc Grove?

A. Because I had an offer from Mr. M. L. Gillett to take the development of the Lucerne Park Citrus Grove, situated in the southern part of the State.

X Q. 200. You mean you just got a better offer, that is the reason you left?

A. I figured with him along in the winter, shortly after Christmas time when he first approached me, of the year 1911.

X Q. 201. Was that after Mr. Chilton died?

A. Yes, sir.

X Q. 202. How soon after you went there did Mr. Chilton die?

A. About a year after I went there.

X Q. 203. Did you ever discuss with Mr. Chilton the question of using washing powder or anything else in the water of the washer?

A. I think I did. At one time down at the office.

X Q. 204. In what connection did you have that discussion?

A. In regard to the sooty mold, showing so bad on the Home Grove.

X Q. 205. You had nothing to do with the work at the Home Grove, did you?

A. Not actual supervision of it. Of course I was there many times.

[fol. 477] X Q. 206. That was personally supervised by Mr. Chilton?

A. I would say no to that question.

X Q. 207. Did he not personally supervise the work at the Jungle Grove also?

A. Mr. Chilton? Very seldom was Mr. Chilton ever at the house, at the packing house.

X Q. 208. Did not Mr. Chilton keep pretty close scrutiny on all the work that went on at both the Jungle Grove and the Home Grove?

A. Why he was there on the job, as you would say, and was manager of the properties.

X Q. 209. And responsible for what went on there, at both the Home Grove and the Jungle Grove?

A. I would consider anyone who held that position would be responsible, if he was working under me.

X Q. 210. Now, did you make any changes in the packing house practice at the Jungle Grove after you went there?

A. Just how do you mean that?

X Q. 211. Well, you found something going on there, I suppose, when you went there, you found the set-up for certain work to be done; did you make any changes or did you endeavor to carry out the practice that you found when you went there?

A. You have got into a long story now, first thing.

X Q. 213. Will you answer the question please?

A. I could not very well make changes because the house was not running.

X Q. 214. I suppose when you went there a man from Minnesota that knew nothing about the citrus fruit, they say—here is a packing house, pack the fruit; is that right?

A. Certainly not. He was not in the packing house.

[fol. 478] X Q. 215. Did not Mr. Chilton tell you how he wanted the fruit packed?

A. Mr. Chilton told me to go down to Mr. Hart's grove and try and learn every detail of his methods of packing, as Mr. Connor wanted to use the same method in their houses.

X Q. 216. Mr. Chilton had been packing fruit at his packing houses for some seasons, had not he, before you got there?

A. Undoubtedly. That was at the Home packing house.

X Q. 217. Yes. Was the Home Grove packing house running when you went to the Hart house?

A. No, sir, not as I remember it. They had not started it.

X Q. 218. So that all the instructions you had received from Mr. Chilton was to go and find out what you could from Mr. Hart; did you talk to him about it at all as to what you would do when you started in at the Jungle Grove?

A. I wish in connection with the—can I be allowed to talk?

X Q. 219. Answer the question. You understand the question, I suppose?

The Court: What is it you want to do, make a further explanation on some previous question?

The Witness: There is an explanation there that would clear the whole thing.

The Court: Further in answer to the last question?

The Witness: Mr. Morton, he has shown a couple of letters that I had written. In the files where he obtained those there should be copies of letters that were written to me that would explain all of these reasons if you want to produce them.

[fol. 479] The Court: Do you want that stricken out?

Mr. Morton: I think it had better be.

The Court: All right.

X Q. 220. Can you answer the last question?

A. Read the question.

(X Q. 218 repeated as recorded.)

A. I would say yes.

X Q. 221. Mr. Chilton gave you some instructions as to what to do at the Jungle Grove, did he not?

A. I am answering the question as to what I was to learn when I went to the Hart's packing house.

X Q. 222. Yes.

A. As a matter of fact, I had a personal letter from Mr. Connor telling me that he was going to have me sent to Mr. Hart's packing house, and that he had written Mr. Chilton to go out and instruct me to go there. I knew all of that before Mr. Chilton came out there.

X Q. 223. I know about your going there, but is that all the instructions you received as to what to do at the Jungle Packing House; did Mr. Chilton find out whether you had learned to pack fruit at the Hart Packing House?

A. He had a great deal of confidence in Mr. Hart. He undoubtedly did, but in connection with that, Mr. Morton, when Mr. Chilton gave me the keys to the Jungle Packing House, we both went over the house and I asked him for suggestions and we talked over different things in regard to the packing and who we wanted to use in the different parts of the operation of the house.

X Q. 224. Now, my question is, after you started in packing fruit at the Jungle Packing House, did you make any changes from what you understood the practice to be, what did Mr. Chilton say about it any time afterwards dur- [fol. 480] ing your time there, did he make any changes in the method of packing fruit?

A. Mr. Chilton told me that the Jungle House had never been operated with the exception of possibly just a sample run of fruit to try the machinery. The house was new. You would think—when I first went into it I doubt if it had ever been used, so there was not any methods to change there. What I was expected to do was to use the methods that Mr. Hart taught me regardless of what anyone else was doing at Ronnoc Grove. Does that answer the question?

X Q. 225. After you started in, did you make any change in your procedure while you were there?

A. I used Mr. Hart's methods as he taught me.

X Q. 226. And you used them right straight through?

A. Yes.

X Q. 226a. Just what was his method that he taught you?

A. Using extreme care in all operations, in handling, being very particular in regard to all grading operations and packing.

X Q. 227. Was that in any way any different from what Mr. Chilton was doing at the Home Grove?

A. Well, I should judge so from letters that I had received from Mr. Connor.

X Q. 228. That is all you know about what went on at the Home Grove, what you heard from Mr. Connor?

A. I was in Minnesota at that time, I could not tell you.

X Q. 229. While you were at the Jungle Grove they were having fruit in that Home Grove, were they not?

A. You mean during the winter?

X Q. 230. The season that you were at the Jungle Grove, [fol. 481] the Home Grove was in operation so far as you know, was it not, you were over there from time to time, you said?

A. Yes, during the fruit season. There is one thing that has not been brought out here that would clear up quite a little bit of it, and that is this, that in the last week of December, 1909, Florida suffered from one of her periodical colds, and at the Jungle Grove we lost about ten thousand boxes of fruit from freezing, consequently our operations stopped.

Mr. Morton: I do not see that that is responsive to anything I have asked. I would like to ask for that to be stricken out.

The Court: I do not know that that is in explanation of anything that has been asked. The motion is granted.

X Q. 231. What I want to find out, Mr. Niles, is whether you used at the Jungle Grove, the methods of packing practiced by Mr. Chilton at the Home Grove, and you must have known what was going on there, certainly enough to be able to tell me whether your methods were the same as his while you were there?

A. The supposition is that all of Hart's houses were using—all of Mr. Connor's houses as the two—were using Mr. Hart's method in packing, but some of their foremen did not keep up the standard set by Mr. Hart, and Mr. Chilton was dissatisfied. I understood that is the reason why he sent me to the Hart house, to learn the method.

X Q. 232. He wanted you to learn it first hand from Mr. Hart what to do?

A. Exactly that way.

X Q. 233. And except that you think you used perhaps greater care than they did at the Home House, the methods of packing were substantially the same, is that correct?

[fol. 482] A. I never saw the Home House operated until during the time that we were operating the Jungle Grove.

X Q. 234. Yes.

A. At that time a man had been sent down from the Home Grove to Mr. Hart's house to acquire the method just the same as I had. I supposed he was in charge of the house. Consequently, would be using the same methods that I was using at the Jungle Grove.

X Q. 235. And so far as you know, the same method was being used at the Home Grove as at the Jungle Grove?

A. Very similar, with the exception that we always prided ourselves as being a little better than anyone else.

X Q. 236. You had the same kind of machinery and arranged in the same general way and put through the same kind of operations; is that correct?

A. Both houses were modeled from Mr. Hart's houses; the only difference in the machinery that I know of was that the hand sizer had two rolls at the Home Grove and only one at the Jungle House.

X Q. 237. Did you make any changes in the practices at your house after you started in there or did you continue to use the methods which you had learned at Mr. Hart's house throughout the term of your time there?

A. To the best of my ability.

X Q. 238. You endeavored to carry out Mr. Hart's instructions the whole time you were there?

A. I would say so.

X Q. 239. Do you recall the representative of the American Fruit Growers, Mr. Pilkington, coming to see you on the evening of on or about November 4, 1926, and discussing with you the question of using borax at the Jungle House?

A. Perfectly.

[fol. 483] X Q. 240. Do you recall telling Pilkington that you kept records of the work you did there and that you thought you might find something in the records that would be helpful to the case of the American Fruit Growers?

A. I stated that I had up until the year 1924, when I went with the Palmer Grove at Sarasota, a number of letters and also the original of the detailed plan of the Jungle Grove included among them but at that time when I moved from my home place that I had destroyed many of those but possibly there might be something in reference to it among my old papers.

X Q. 241. Did you not tell him that you might have among your old papers records that would be helpful to the American Fruit Growers in this case?

A. Hardly in those words. I told you as I stated that I might have among some of my old papers reference to methods used at the Jungle Grove.

X Q. 242. Did you not tell him that a long time had elapsed and that you thought you could find matter in your records that would be helpful?

A. I do not remember the word helpful. I told him in regard to the old papers that I might have.

X Q. 243. You understood from Mr. Pilkington at that interview what the issues in this case were about, did you not?

A. I had to cross-examine Mr. Pilkington very closely before I could get any inkling of it.

X Q. 244. However, you may have proceeded, you did understand what the issues were in this case, did you not at that time?

A. Do you mean in regard to this suit?

X Q. 245. Yes.

A. I finally got it pretty well and pretty clearly.

X Q. 246. Did he not tell you early in the interview that Mr. Manning had given him your name as one of the people that had worked at the Ronnoc Grove for a short time [fol. 484] and that you might recall something about the practice there?

A. No, sir.

X Q. 247. He did not tell you that?

A. Not Manning. He did not say that Mr. Manning told him that.

X Q. 248. Do you recall a few days after that, on or about November 8th, 1926, Mr. Skelly of the American Fruit Growers called on you and asked you if you had an opportunity to look for the records that you had told Mr. Pilkington about?

A. Yes, sir.

X Q. 249. And do you remember telling him that you had not had time to look for your records but that you had been thinking about it and that you did remember that you used borax at the Jungle Grove?

A. Do you say in a commercial way?

X Q. 250. I ask you do you recall telling Mr. Skelly that after thinking about the matter since your interview with Mr. Pilkington, you did remember that you had used borax at the Jungle Grove; did you say that to him?

A. That would not insinuate in any way as a commercial proposition.

X Q. 251. I ask you do you recall making that statement to Mr. Skelly at that time?

By the Court:

Q. 252. The question is what you said and not what you did—what you said as far as your statement to Mr. Skelly went?

A. In an experimental way, yes.

X Q. 253. Did you tell Mr. Skelly in an experimental way or did you simply say that you used the borax?

A. Can I answer that question?

Mr. Morton: I will be glad to have him answer your question.

[fol. 485] The Court: My question is another question. I am trying to indicate to the witness what you are asking for. You may repeat the question if you want to or you may put the question that you want him to answer if you want to.

By Mr. Morton:

X Q. 254. What did you say to Mr. Skelly about the use of borax at the Jungle Packing House?

A. I told Mr. Skelly that as he well knew this East Coast fruit was very hard to handle, we had to use extreme care in all handling operations and there was more or less trouble with it. I told him that a great many things had been tried while I was there at the Jungle house. Where he got the idea was that I used the word "we" when I should have used the personal pronoun "I" and that among those was sodium borate.

X Q. 255. Did you say all that to Mr. Skelly?

A. And more, too.

X Q. 256. Or did you merely tell him that you had used borax there?

A. Only in experimenfal work, as I have found the records showing.

X Q. 257. Did you also say to Mr. Skelly that you had among your records material that would put the American Fruit Growers' case in the clear?

A. I would be foolish to say that.

X Q. 258. Did you or did you not say it?

A. No, sir.

X Q. 259. Did you say to him that the information which you had ought to be worth something to the American Fruit Growers?

By the Court:

Q. 260. Can you answer that yes or no?

A. I would answer that with a reservation. Can I make a statement?

[fol. 486] Q. 261. You may answer that yes or no and then make any statement that you want in explanation. Did you say it or did you not, or words to that effect?

A. Read the question over for me.

(The last question of Mr. Morton was thereupon repeated by the stenographer.)

A. No.

By the Court:

Q. 262. Now, you may make any explanation that you want to.

A. I merely want to state this, that following those conversations that Mr. Morton alludes to that I made notes of the conversations, answers and questions complete, as I remember them, and wrote them out complete for my own protection. I would state further that I sent a copy of those notes to Mr. Steward.

By Mr. Morton:

X Q. 263. When did you first have any communication with the plaintiff's representatives in this case?

A. I would say it must have been at the end of November or about the first of December, 1926.

X Q. 264. That was after this interview with Mr. Skelly, some weeks after, was it not?

A. I would judge so; I have the dates of it.

X Q. 265. Had you made notes immediately on your interview with Mr. Skelly?

A. Yes, sir.

X Q. 266. When did you make those notes?

A. Do you mean how soon?

X Q. 267. How soon after the interview did you make those notes?

A. I made some so-called field notes, that is, memoranda, as soon after as I could and I made a copy of those field notes some time later than that.

X Q. 268. Did you at a later date, about November 12th, go up to Orlando to the office of the American Fruit Grow-[fol. 487] ers and have a further interview with Mr. Pilkington and Mr. Skelly?

A. At the request of Mr. Skelly I did so; yes, sir. I have not the dates to refresh my mind, but that is the third conversation you have reference to.

X Q. 269. That was on or about the 12th?

A. It is the third conversation. First, Mr. Pilkington called at my house and then Mr. Skelly called at my house, and then at Mr. Skelly's request I stopped at their office at Orlando.

X Q. 270. At the interview with Mr. Skelly at your house, you told Mr. Skelly that you would look through your notes and let them know what you found; is that correct?

A. I believe so.

X Q. 271. And you came to Orlando on or about November 12th?

A. My recollection is that it was later than that.

X Q. 272. About what date do you recall? You think it was later than the 12th?

A. I would say so.

X Q. 273. At that interview, the third interview, did you not say to Mr. Skelly and to Mr. Pilkington that you made changes in the procedure at the Jungle packing house and that you found they were using the solution too strong in the washer and after you took charge of the packing house

you did not use so strong a solution but found you could get better results by spraying the solution on the fruit after it was dried?

A. What solution do you have reference to?

X Q. 274. I am just asking you if you made that statement to Mr. Skelly and to Mr. Pilkington?

A. No, sir; I did not.

X Q. 275. You made no such statement?

A. No, sir

X Q. 276. And when Mr. Skelly or Mr. Pilkington asked you whether or not the solution that you used contained [fol. 488] borax you said, "I have not said that it did or did not"?

A. I was speaking of an experimental solution.

X Q. 277. What did you say about an experimental solution?

A. I told them that many things were tried and so they were.

X Q. 278. Did you not say that they were using the solution too strong in the washer and that you made it weaker?

A. In the Jungle Grove washer?

X Q. 279. In the Jungle Grove washer.

A. There never was anything used in the washer until the last month of 1911 that I was there.

X Q. 280. And did you not also say that after you took charge of the packing you were sprinkling the solution on the oranges on the dry rack?

A. No, sir.

X Q. 281. You said nothing like that?

A. No, sir.

X Q. 282. When they asked you whether or not the solution contained borax, you said you did not say it did and did not say it did not?

A. We did not have that kind of a conversation.

X Q. 283. You did not have a conversation like that at all?

A. Not in the words that you say; no, sir.

X Q. 284. Did you not say that you thought it important to keep the tank of the washer disinfected?

A. One cannot be too careful in keeping the place in any packing house clean and in good condition.

The Court: Mr. Morton's question is now about what you said and not what you should do.

The Witness: I beg your pardon.

(The stenographer thereupon repeated the last question.)

[fol. 489] A. Can I ask if Mr. Morton has reference to what we were doing in the Jungle house?

By Mr. Morton:

XQ. 285. I asked you if you recall saying to Mr. Skelly and Mr. Pilkington at this third interview at the office of the American Fruit Growers that in your practice at the Jungle Grove you had regarded it as important to keep the tank disinfected?

A. No, sir.

XQ. 286. Did you tell Mr. Skelly or Mr. Pilkington at that interview that you had partially concluded your search of your notes and that you had found sufficient material to put their case in the clear, as you expressed it?

A. No, sir.

XQ. 287. Did you not say to Mr. Skelly and to Mr. Pilkington that you had been giving your services to the industry free for a long time and it was about time that you got something out of it?

A. Not words to that effect; no, sir.

XQ. 288. Are you now employed by the plaintiff company?

A. I am working for Mr. Steward.

XQ. 289. How long have you been working for Mr. Steward?

A. In the neighborhood of two months.

XQ. 290. Did you start in working for Mr. Steward about the last of November?

A. Possibly so.

XQ. 291. And you have been working for him ever since?

A. Yes, sir.

XQ. 292. What led you to experiment with borax at the Jungle packing house?

A. For this reason. My training had been such that I knew something of chemicals; in fact, when I came to Flor-

[fol. 490] ida I brought a very complete kit of veterinary outfit including medicines, chemicals, which would include disinfectants and antiseptics and fungicides and hypodermics and consequently I knew some of the effect that could be expected from chemicals.

Mr. Morton: That is all.

Redirect examination.

By Mr. Neave:

R. D. Q. 293. There are two letters of yours that Mr. Morton has put in evidence, the first one is marked Defendant's Exhibit No. 44, and purports to have been written from Daytona Beach, and is dated September 29, 1909. State whether or not prior to that date you had been in New Smyrna.

A. Yes, sir.

R. D. Q. 294. You have said that in two seasons while you were at the Minnesota Experimental Station you were in charge of live stock. What does that term "in charge of live stock" mean, and how much of your time did it take?

A. As I stated to Mr. Morton in saying in charge of live stock would mean that I took the exhibit of fat steers which the State of Minnesota showed at the International Exposition of Chicago, I was in full charge of taking that to the show and responsible for it.

R. D. Q. 295. And how much of your time a year would that take?

A. It took about three to four weeks to make the complete trip and in preparation for that would take four or five months.

R. D. Q. 296. And during the rest of the time in each year what were you doing, working on live stock?

A. Routine work, experimental work. That is an experimental station.

R. D. Q. 296a. On what kinds of things?

[fol. 491] A. We kept records of practically everything. We kept records of grain plants and varieties and checked everything; they even kept a record of what all the stock on the place ate, and that was all worked up into data.

R. D. Q. 297. You said that when you left Ronnoc Grove, you went to Lucerne Park?

A. Lucerne Park Fruit Association.

R. D. Q. 298. What was that—a new enterprise or an old one?

A. A new enterprise.

R. D. Q. 299. What was its character and size?

A. It was a citrus development of M. E. Gillette that he put up and they advertised it first as the one thousand-acre-grove and we lafer planted 1200 acres and at that time it was the largest citrus development in Florida and I guess in the United States.

R. D. Q. 300. Did you voluntarily sever your connection with Ronnoc Grove or were you asked to do so by the owners, by Mr. Chilton or Mr. Connor?

A. I made the deal with Mr. M. E. Gillette and I wrote to Mr. Connor—I think it must have been in March of 1911—I do not remember just all the details I gave him in regard to it—but one was asking him for a letter of recommendation.

R. D. Q. 301. And did he give you that letter of recommendation?

A. Oh, yes, I had quite a lot of personal correspondence.

R. D. Q. 302. Who is this Mr. Pilkington that you and Mr. Morton have been speaking of?

A. He is an old friend of mine that is with the American Fruit Growers.

R. D. Q. 303. Was he with the American Fruit Growers at the time when you had these conferences with him that you and Mr. Morton have been speaking of?

A. Yes, I distinctly asked him if he was.

[fol. 492] R. D. Q. 304. And what is his connection with the American Fruit Growers, what did you understand his connection to be?

A. Official position I could not say. I always understood he was confidential man with Crutchfield.

R. D. Q. 305. Who is this Mr. Skelly that you have been speaking of?

A. He is the sales manager of the American Fruit Growers.

R. D. Q. 306. Did you have more than one conversation with Mr. Skelly, of these conversations that Mr. Morton has been talking of?

A. I saw Mr. Skelly at three different times.

R. D. Q. 307. At any of those times did Mr. Skelly mention to you Shady Manning?

A. Yes, sir.

R. D. Q. 308. What did he say to you about him?

A. I did not get the information I wanted as to why they were making inquiries such as they were, and so I asked him whom they had seen. I first asked Mr. Pilkington—this is prior to Mr. Skelly—I asked Mr. Pilkington if he had seen any of the old men who worked at Ronnoc Grove and he said yes that he had seen some of the darkies and they told him that Niles was the man to see and that he knew about it. I asked Mr. Pilkington if he had seen anyone else and he said yes he had seen Manning. As soon as he mentioned Manning I think I asked him if Manning knew about it, and he said yes Manning remembers it perfectly. Knowing the circumstances as I did, of course I knew that what Manning was telling them could not be right.

R. D. Q. 309. You say that he said that Manning knew it?

A. They were talking about using borax in the water.

R. D. Q. 310. What did Mr. Skelly say to you about Manning?

[fol. 493] A. The first conversation I had with Mr. Skelly he asked me if we used borax, I answered him in this way: "Mr. Pilkington called the other night and asked me the same question and I asked him if any of the old people had remembered using it" and he told me of borax and also of the man called Manning.

R. D. Q. 311. Then what did Mr. Skelly tell you about Mr. Manning?

A. He said he remembered it perfectly. He said that Manning remembered it perfectly and the amount they used and everything.

R. D. Q. 312. And what did you say to Mr. Skelly?

A. I did not reply to that at all.

R. D. Q. 313. Have you any interest in the Brogdex Company?

A. No, sir.

R. D. Q. 314. Have you any interest in the result of this suit?

A. No, sir.

R. D. Q. 315. What have you been doing for Mr. Steward? You said you had been working for him recently?

A. I said Mr. Steward because Mr. Steward has, as I understand, charge of the case but Mr. Massie was the one that really asked me the questions.

R. D. Q. 316. He was another lawyer associated with Mr. Steward?

A. Yes.

R. D. Q. 317. What have you been doing for Mr. Steward or Mr. Massie?

A. I have been looking up old records, old literature, researching investigation I would call it.

R. D. Q. 318. Where have you been doing that?

A. First I went through all of the old bulletins and things which I have been collecting some 25 years and from there I went to Gainesville, Florida, and went through their [fol. 494] library. When I was through there I went to Washington and then worked in the Department of Agriculture Library.

Mr. Neave: That is all.

Re-cross-examination.

By Mr. Morton:

R. X. Q. 319. When Mr. Skelly told you that Mr. Manning remembered the use of borax perfectly, did you tell Mr. Skelly that Mr. Manning was mistaken?

A. At the third conversation in Orlando, Mr.——

Mr. Neave: Just answer that question, if you will allow me to interrupt, Mr. Morton.

(The stenographer thereupon repeated the last question.)

A. No.

Mr. Morton: That is all.

Re-direct-examination.

By Mr. Neave:

R. D. Q. 320. What did you tell him?

A. I said something like this: "Do you boys know this man Manning?" I answered it in that way.

R. D. Q. 321. Then what did Mr. Skelly say?

A. Mr. Skelly winked at me and said "They call him Shady for short."

Mr. Neave: That is all.

(Witness excused.)

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[495] GILBERT T. BALLANTYNE

GILBERT T. BALLANTYNE was called as a witness in rebuttal on behalf of the plaintiff and, having been duly sworn, testified as follows:

Direct examination.

By Mr. Neave:

I live at South Jacksonville, Florida. At present I am working for the Florida East Coast Railroad.

I started working for W. S. Hart in his packing house in Florida in the year 1902 and continued till the latter part of February or beginning of March, 1909. There was just one packing house at Hart's Grove while I was there.

When I first started with him in the latter part of May or beginning of June taking charge of the grove, and then that fall when the orange business came in, I worked for him that summer and I picked and hauled into the packing house and washed the fruit and hauled to the depot and at spare times I graded in the packing house and handed the fruit to the hopper where the sizer was.

In 1902, when I first went there to that packing house, there was an old time washer there made out of a kerosene barrel with a square face cut in the middle where the bung is. The door was fixed in that with hinges with a button to close it. That barrel was put upon a frame and revolved by hand. Inside of that barrel we put water and cypress sawdust, the sawdust was looked over to see that the splinters were taken out of it. That was revolved by hand on

this frame. We did not put anything else in there except water, cypress sawdust and oranges.

I continued to work in that packing house until the spring of 1909. We continued to use that type of washer about two seasons while I was there, and then we installed a Warner Washer.

[fol. 496] Into the Warner Washer besides water and oranges we used sponges, got them by the bale. Nothing else; only sometimes when we experimented, we experimented with Pearline and Gold Dust, but we just used that on one or two occasions and Mr. Hart told me not to use it.

We had to protect the fruit against frost by these pine fires put on the northwest side of the tree to protect the trees from the cold and the oranges from freezing. That rich pine wood which we have in Florida is full of turpentine and throws off a black soot and we very seldom used it. Mr. Hart told me to keep washing powder out of the water as much as I could because he was afraid of it. While I was there at Mr. Hart's I used nothing in the water except the Pearline and the sponges and clear water.

Mr. Hart asked me to take my help and go up to Ronnoc Grove in the spring of 1907, the latter part of March or beginning of April. He told me to put that packing house—put up the fruit in shape as near as I could like here.

I went to the Home packing house at Ronnoc Grove. As good as I remember I stayed there about ten days. Mr. Ben Chilton was the manager of Ronnoc Groves then.

I only took two men and a woman grader with me because our help every year at Mr. Hart's packing house consisted mostly of boys and girls working there and they were about ready to go home and I satisfied myself with one packer, a washer and a grader, and I knew that I could get through. The whole packing house was running when I got there. There were oranges in the packing house and graders. The washers were not being used. There was a washer installed there at that time, the same kind of type as Mr. Hart's, the Warner.

[fol. 497] When I went up I stopped at Mr. Ben Chilton's office in the Connor estate there and called for Mr. Chilton. He called up the bunch when I went in there and he called them to order and said, "Mr. Ballantyne has got complete control of the packing house and what he says goes."

I looked over the fruit in the bins and Mr. Connor was with Mr. Chilton and I told him of the condition of the fruit in the bins, and I was going to start off on the pickers.

I went out there and I did not know any of the pickers at that time who were picking the fruit and I went out there and just looked at them and watched them pick the fruit. I saw them dump them into the boxes and I made a remark something like this: "If I had anybody that picked fruit like that for me after the trouble of making it, I would take a mule whip to him," and one of the darkies asked me what business it was of mine and I told him it was a lot of my business because I was instructed to come up here and put this fruit in shape and have it handled right and to learn them the methods of W. S. Hart. I took some chalk out of my pocket and I gave each one a number the same as at Hart's. I told him that each man had to have a number on his box when he came in, that my man in charge of the washer would have the numbers of these different fellows and I wanted them to give their names and if their fruit did not come in right they would hear from me.

I then went back and I put Mr. W. S. Waite, a man I brought with me, in charge of the washer. I looked at the washer and gave him instructions to take the cylinder out because the bagging was all loose and I told him to sew a new lining in. I got up on the drying rack and walked down on that and I came back and told him before I went in to go over the drying rack and drive down all the nails that [fol. 498] were sticking up and take off all the projecting edges and put it in the shape that Mr. Hart's drying rack was in, and he said he would.

I found the bins in pretty bad condition. In fact, I told the graders what was there and the bunch all threw out what was in the bins and I did not want to have anything to do with it. And I put them to work and scraped and cleaned the bins and cleaned up the packing house in general.

I did not find any chemicals around there. There were no signs of any chemicals having been used there that I saw. There were no powders of any kind around there that I saw, after cleaning up the packing house.

The fruits commenced coming in that we had picked, and then I put my fruit into shape that Mr. Hart was putting

through, the graders, I put a woman in charge of the graders by the name of Mary Seaver. We used in the washer just sponges and clear water and oranges, that is all.

While I was there I did not use anything else in the washer.

At Hart's the culls were plentiful and Mr. Hart taught me that every doubtful orange was a cull. That is what I told them at Ronnoc Grove, "that every doubtful orange was a cull." And we had even to train the pickers and if he picked an orange then it was a cull if it was got from the ground. The same with the ones put in and taken out of a washer and taken out the other end.

I met Gus Taylor while I was there. He was a colored man. He was the darkey that spoke to me as he asked me what business it was of mine when I came up there, I found out afterwards. While I was there he was picking and hauling to the packing house and hauling to the depot.

Q. 46. Did you have any evidence from Mr. Connor that you had done what he expected you to do there in re- [fol. 499]: organizing?

A. Mr. Connor, yes, I asked him who ran the packing house and wanted him to come around occasionally and see how things were going on, so when we got into operation he used to come in.

Q. 47. You were only there ten days?

A. Well——

Q. 48. Did Connor send you back or was your time up that you stayed only ten days?

A. That was the agreement, I could not stay any longer. I agreed with him to leave this man here because at that time of year he was very particular for me to get back to work with Mr. Hart, to haul out the wood out of the grove and get into cultivation.

Q. 49. Who were you being paid by during those ten days at Ronnoc Grove?

A. Mr. Ben Chilton paid me.

(No cross-examination.)

Mr. Neave: Defendant's Exhibit 16 consists of certain disjointed pages from a book by E. Bourcart on Insecticides,

Fungicides and Weed Killers. I offer in evidence two more pages from that same book, namely, pages 97 and 208.

(Received in evidence and marked "Plaintiff's Exhibit No. 85.")

Mr. Neave: Defendant's Exhibit No. 17 is a book or article by Bitting on the physiological effect of various agents on the development of some moulds (Defendant's Exhibit No. 17, page 346 of the record) and certain other things, but only certain pages have been offered in evidence by the defendant. I offer in evidence page 5 which is the beginning of that article, which shows the scope of the work that was done and the character of it.

(Received in evidence and marked "Plaintiff's Exhibit No. 86.")

[fol. 500] Mr. Neave: I offer in evidence a certified copy of the file wrapper and contents of the patent in suit.

(Received in evidence and marked "Plaintiff's Exhibit No. 87.")

Defendant's Sur-Rebuttal Proofs

Charles R. Pilkington

Charles R. Pilkington was called in sur-rebuttal on behalf of the defendants and, having been duly sworn, testified as follows:

Direct examination.

By Mr. Morton:

Q. 1. What is your business, Mr. Pilkington?

A. I am in the American Fruit Growers, Incorporated, and treasurer of the Orlando Division.

Q. 2. You are located at Orlando?

A. Orlando, yes.

Q. 3. Do you recall a meeting at the New Smyrna Packing House on Sunday, about October 31, at which Mr. McCorkle, who testified here, was present?

A. I do.

Q. 3a. Do you remember interrogating Mr. McCorkle about his knowledge of the use of borax at the Ronnoc Grove Packing House?

A. Yes, sir.

Q. 4. Do you recall interrogating Mr. McCorkle about his knowledge of the use of borax at Ronnoc Groves?

A. Yes, sir.

Q. 5. Do you recall what Mr. McCorkle said as to his knowledge on that subject?

A. Yes, sir.

[fol. 501] Q. 7. Did he at that time say to you in substance that he recalled that something was used in the tank at the Home Grove, but that he did not recall in what quantity or what it was?

A. Yes, sir, he said that.

Q. 8. State whether or not he said in substance that his work was in the house as head of the packers, and that he did not know very well or recall very well what went on at the washer?

A. Yes, sir, he said that.

Q. 10. Do you recall that Mr. Corkle said to you that the washing was done by Gus Taylor, and that he ought to know what was done?

A. Yes, sir.

Q. 11. Did Mr. McCorkle say that he did not know what was done?

A. Yes, sir.

Q. 12. Did Mr. McCorkle say that there was a can that was used to scoop up things to put in the washer?

A. He said that was his recollection.

Q. 13. Did you have an interview with Mr. Niles on or about November 4th, at his residence?

A. I did.

Q. 14. Did Mr. Niles say to you at that time that he thought his notes contained information that would put your case in clear?

A. Not at that particular interview; that is of November 4th you are talking about?

Q. 15. Did you have a subsequent interview with Mr. Niles?

A. Yes, sir.

Q. 16. On or about November 12th?

A. November 12th.

Q. 17. At the office of the American Fruit Growers in Orlando?

A. Yes, sir, in my office.

[fol. 502] Q. 18. Did Mr. Niles say at that time that his notes contained matter which would put the case of the American Fruit Growers in clear?

A. He said that he had examined his records and to the extent of knowing that they would disclose information that would put our case in clear, yes, sir.

Q. 19. Did Mr. Niles at that time say that he had been giving his information to the citrus industry for nothing for a long time, and he thought it was about time that he got something out of it?

A. Yes, sir, in effect.

Q. 20. Did Mr. Niles tell you at that interview or at the interview of November 4th, that he did not use borax in the washing tank?

A. No, sir, no.

Q. 21. Did Mr. Niles tell you at the interview on November 12th at the office of the Orlando Fruit Growers that he had made changes in the packing practice at the Jungle Packing House, that he had found the solution in the tank too strong, and that he found a weaker solution would do and that the solution was more effective if sprayed on the oranges when they were dry on the rack?

A. Yes, sir; maybe not in exactly those words, but to that effect, sir.

Q. 22. Is that a fair and accurate statement of the substance?

A. Yes, sir.

Q. 23. Who was present at the interview of November 12th, at the office at Orlando?

A. F. L. Skelly.

Q. 24. And who was present at the interview with Mr. McCorkle at New Smyrna?

A. Mr. Morton, yourself, sir, Mr. Kirby Chilton and Mr. N. H. Harper was there part of the time.

Q. 25. Who is Mr. N. H. Harper?

[fol. 503] A. He is the manager of the New Smyrna Packing Company.

Q. 26. The interview was held in his office?

A. Yes, sir, in his office.

Cross-examination.

By Mr. Neave:

X Q. 26a. Who is this man, is he connected as the manager of the New Smyrna or is he connected with the American Fruit Growers?

A. He is the manager of the New Smyrna Packing Company.

X Q. 27. Is he manager of the American Fruit Growers?

A. No, sir, he is manager of the New Smyrna packing house.

X Q. 28. How many conversations did you have with Mr. Niles on how many occasions?

A. Two interviews with Mr. Niles, Mr. Neave, and for a very few moments I saw Mr. Niles afterward, but we had no practical discussion.

X Q. 29. When was the first of these interviews?

A. November 4th, at his home.

XQ. 30. November 4th?

A. Yes, sir.

X Q. 31. When was the second?

A. November 12th.

X Q. 32. And where?

A. At the office of the American Fruit Growers, my office in Orlando.

X Q. 33. Who was present at the November 4th interview besides you and Mr. Niles?

A. Mr. Niles' son, I think, was in his living room at the same time. He was not engaged in the conversation.

X Q. 34. And then at the second interview on November [fol. 504] 12, you and Skelly and Mr. Morton and this other man?

A. No, Mr. Morton was not there.

X Q. 35. What was the interview at which Mr. Morton was present?

A. That was at New Smyrna.

XQ. 36. What was the date of that?

A. That was October 31.

X Q. 37. Well, then, there are three interviews, are there not?

A. Not with Mr. Niles.

X Q. 38. Niles was not there on the October interview?

A. Niles was not there.

X Q. 39. And how did you fix those dates, November 4 and 12, for these two interviews?

A. November 4 and 12—well, because I fix the first one by this, that on November 3 I drove Mr. Morton to Tampa, where he took the night train to New York and he left that night on the train about eleven o'clock, I think the train left, and I stayed all night in Tampa, and it was the next evening that I saw Mr. Niles.

X Q. 40. Where were you on November 15th?

A. November 15th? I am afraid, sir, that I cannot say positively as to that. If you can refresh my recollection, I might remember.

X Q. 41. At what time of day was it that you had this interview which you say was on November 4th at Mr. Niles' house?

A. It was in the evening about half-past eight or quarter of nine o'clock.

X Q. 42. And how did you fix the date as November 12 of your second meeting?

A. Well, fixed that date by my own recollection of it that Mr. Niles came to Orlando on Friday of the following week and as a matter of fact, the correspondence and my records show it

[fol. 505] X Q. 43. After the interview with Mr. Niles, which you say was on November 4th, did you write any letter about it?

A. Did I write any letter about it? To him?

X Q. 44. To anybody?

A. Yes, sir.

X Q. 45. To whom?

A. I wrote to Mr. McCready.

X Q. 46. Who is——

A. General counsel of the American Fruit Growers, Pittsburgh.

X Q. 47. Did you write to anybody else?

A. About that?

X Q. 48. Yes,

A. I sent a copy of it, I think, to Mr. Morton.

X Q. 49. To anybody else?

A. No.

X Q. 50. Did you send a copy to Mr. Skelly?

A. No.

X Q. 51. Did you show him a copy at any other time?

A. I do not remember that I did, sir. I discussed the situation with Mr. Skelly. I do not remember I did. Mr. Skelly was away at the time I wrote the letter.

X Q. 52. Did not you send a copy of it to Mr. Skelly?

A. No, sir.

X Q. 53. After your interview of November 12, did you write any letter about that interview?

A. I did not write a letter.

X Q. 54. Did you write a report of some kind?

A. I wrote a report of that interview.

X Q. 55. To whom did you send that?

A. A copy to Mr. McCready and a copy to Mr. Morton.

X Q. 56. And a copy to Mr. Skelly?

A. No.

[fol. 506] X Q. 57. This letter which you say you wrote after November 4th and the report which you say you wrote after November 12th, have you shown copies of that letter to other people besides Mr. McCready and Mr. Morton?

A. No, not that I know of.

X Q. 58. Have you looked at those letters recently?

A. There was only one letter.

X Q. 59. Have you looked at that letter recently?

A. Yes, sir.

X Q. 60. And looked at that report recently?

A. Yes, sir.

X Q. 61. Were they dated?

A. Yes, sir.

X Q. 62. Have you got them here?

A. I have not them. Mr. McCready may have them.

X Q. 63. When you wrote that letter, did you keep a copy of it?

A. Yes.

X Q. 64. In the files of the company?

A. In my own files.

X Q. 65. Well, as an officer of the company?

A. Yes.

X Q. 66. And how about the report, did you keep a copy of that report and file it?

A. Yes, sir.

Mr. Neave: I would like to see the letter and report.

Mr. Morton: I think that is a privileged communication.

Mr. Neave: I thought it was not privileged. He was keeping copies in the files of the company.

The Court: I think that is a privileged communication and it has not been shown so far that the witness has used these letters to refresh his recollection before coming on [fol. 507] the stand.

Mr. Neave: I thought that I covered that. Perhaps my last question was not sufficient for that. May I ask another question, then?

X Q. 67. When did you read this letter and this report last?

A. Mr. Neave——

X Q. 68. Excuse me.

The Court: It seems to me that the question that you have in mind, I assume the sort of question you have in mind, does not meet that situation. If this testimony is given wholly without regard—however, I think I had better not go any further. I think I have gone far enough to indicate to counsel what I started to say, and that is probably as far as I ought to go.

Mr. Neave: May I ask your Honor——

X Q. 69. Did you use these letters to refresh your recollection as to the dates and things which you have testified about, this letter and this report?

A. If I may ask—may I inquire of you, Mr. Neave, just what you mean by refreshing my recollection, that is, to bring it back to my mind? No, sir, I did not, because I recollect the matter very distinctly.

X Q. 70. And recollect the dates, too, did you?

A. Yes, sir; I did, absolutely.

Mr. Neave: And, Mr. Morton, you refuse to produce that letter and that report; is that it?

Mr. Morton: The report contains matter that is confidential in which he comments on this interview.

Mr. Neave: All right; that is all, Mr. Morton.

The Witness: Is that all?

Mr. Neave: Yes, sir.

[fol. 508] FRANK L. SKELLY

FRANK L. SKELLY was called as a witness in sur-rebuttal on behalf of the defendant and, being first duly sworn, testified as follows:

Direct examination.

By Mr. Morton:

Q. 1. What is your occupation?

A. Manager of the American Fruit Growers, Inc., Orlando Division, Orlando, Florida.

Q. 2. Do you recall having an interview with Mr. Niles at his residence on or about November 8, 1926?

A. I do.

Q. 3. Do you recall asking him at that interview whether or not he used borax in the washer at Ronnoc Groves when he was employed there?

A. I did not ask him if he used it in the washer, but I asked him if he used borax at the Ronnoc Groves.

Q. 4. Did he say to you at that interview that he used borax at Ronnoc Groves?

A. He did.

Q. 5. Did he say to you at that interview that he had records which contained matter which would put the American Fruit Growers' case in the clear?

A. He said, "Skolly, you know I kept records all my life, and I am quite sure that I have records that will put the American Fruit Growers in the clear very easily."

Q. 6. Did he say to you at that time that he thought his information ought to be worth something to the American Fruit Growers?

A. He did.

Q. 7. Were you present at a further interview with Mr. Niles on or about November 12th, 1926, at the office of the American Fruit Growers?

A. I was.

[fol. 509] Q. 8. Did Mr. Niles at that time say that he had made changes in the practice at the Jungle Grove while he was there, and that he found them using the solution too strong, and that he used a weaker solution, and that he found it more effective to spray it on the dry fruit instead of using it in the washer?

A. I do not know as it was in those exact words. He said he found a weaker solution in the tank would suffice and he sprinkled the fruit on the dryer with the solution.

Q. 9. Was he asked at that interview what was the composition of the solution?

A. He was.

Q. 10. Was he asked whether or not that solution contained borax?

A. He was.

Q. 11. Did he reply to that that he had not said it did contain borax and he did not say it did not?

A. He did.

Q. 12. Did he say at that interview that he had been giving his information to the citrus industry for a long time and that he thought it was about time that he got something out of it himself?

A. Practically in those words.

Q. 13. Did he say to you at either of these interviews that he did not use borax in the washer at the Jungle Groves?

A. Well, at the interview in the office I do not think he mentioned borax. He called it "it" and in other words he would say "the solution."

Q. 14. Did he say to you that he did not use borax?

A. At the office?

Q. 15. Yes.

A. No.

Q. 16. Do you know Mr. Manning that has been referred to here in this testimony which you have heard?

[fol. 510] A. I met him at the Orlando office when he was there to take his deposition. That is the first I knew of him.

Q. 17. And that was after your interview with Mr. Niles?

A. As I recollect it, yes.

Q. 18. Had you ever known Mr. Manning before that time?

Mr. Neave: I do not think that this is right.

The Court: You mean not in sur-rebuttal?

Mr. Neave: That is right. I thought he would ask the direct question. It is objected to because it is not in sur-rebuttal.

The Court: What have you to say, Mr. Morton?

Mr. Morton: Mr. Niles testified as to what Mr. Skelly said at this interview and as to his knowledge of Manning, and his reply that he knew Mr. Manning.

The Court: Where my difficulty is is that I am laboring under the impression that you went afield there with regard to your last two questions. Am I wrong? So long as you confined it to meeting the testimony in rebuttal, then——

Mr. Morton: The testimony in rebuttal was, as I recall it, that he said Mr. Skelly winked at him and he said he knew Manning and words to that effect.

The Court: If your question is directed specifically to that then the objection must be overruled, but I misunderstood your question if it is that.

Mr. Morton: The question is if he knew Manning at all prior to the date of this interview.

[fol. 511] The Court: If that is the question then I think the objection is well taken.

By Mr. Morton:

Q. 19. Did you hear Mr. Niles in his testimony speak about your winking at him when he mentioned Mr. Manning?

A. I did.

Q. Is that statement true?

A. Not to my knowledge.

Q. 21. Did you know Mr. Manning by reputation or personally prior to the date of that interview?

Mr. Neave: I object to that.

The Court: I will hear you, Mr. Morton.

Mr. Morton: I think that in sur-rebuttal I should not be held down quite so strictly. Action as well as words sometimes come into these matters, and the inference cast was that winking—winking per se means nothing at all, but the inference was that this witness knew Mr. Manning before.

The Court: I think the question or the answer is not admissible for this reason. My exact recollection of the testimony is—and I am not trying to be overexact—but the witness testified, as I recall his testimony, that he asked the present witness whether he knew Manning, and this witness said in substance that which was embodied in your present

question. Whether this witness knew or did not know Manning before that personally, it seems to me, is wholly immaterial. That is the prime reason that I am sustaining the objection. If you want it under Rule 46 you may have it.

[fol. 512] Cross-examination.

By Mr. Neave:

X Q. 22. Did you write any letters or reports or memoranda with regard to these interviews of November 8th and 12th?

A. I did not.

Mr. Neave: That is all.

(Witness excused.)

[fol. 513] Defendant's Depositions

Pursuant to notice of taking depositions on behalf of defendant in the above-entitled suit, at the office of Bordwell, Mathews, & Wadsworth, No. 814 Merchants National Bank Building, Los Angeles, California, on the 18th day of November, 1926, by agreement of counsel, R. F. Steward and Charles E. Townsend, Esqs., appearing on behalf of plaintiff, and W. H. Wadsworth and Frank L. A. Graham, Esqs., appearing on behalf of defendant, the following proceedings were had:

GEORGE WOOD

GEORGE WOOD, of Rialto, California, called as a witness on behalf of the defendant, being first duly sworn, testified as follows:

Direct examination:

I am a fruit buyer, forty-three years old. This is my second season. Prior to that I was in business with Mr. John Cox, of Rialto, for four or five years, in the fruit business. It was under the firm name of Cox & Wood. It was an equal partnership. I looked after the inside work while Mr. Cox looked after the outside interests. The business

of the firm was buying and dealing in fruit on consignment, and shipping. I think it was about 1920 or 1921 that I entered the business. There were about two months prior to that time I was in Florida, but prior to that, around 1918 or 1919, I was assistant manager for Mr. A. H. Morgan, manager for the Rialto Heights Association, at Rialto, California. He was engaged in the packing of citrus fruits. I left Mr. Morgan's employment to go into business with Mr. Cox around 1920, I think; some where around there. I was employed with Mr. Morgan nearly two years but not throughout the two years. There was a period there of about three months that I worked for Mr. MacRae. My [fol. 514] duties during my employment with Mr. Morgan were those of assistant manager; that is, I had charge of the running of the house, packing the fruit; running the fruit and packing it. I had that under my direct supervision under Mr. Morgan.

Mr. Morgan was very particular in the handling of the fruit; more so than anyone I ever worked for. I think it was in 1916—yes, it was—he put in a new house there, very up to date, up-to-date machinery, with a hot water heater on the outside of the house, from which he pumped water into his soaking tank, and kept the water circulating in this tank; and his fruit seemed to carry better, to hold up better. I might say that he kept it at about 90 to 100 degrees Fahrenheit. This apparatus was in the packing house at the time that I entered Mr. Morgan's employment, and it was used during the time that I was employed by Mr. Morgan.

The operation of passing the fruit through this tank which I have referred to, was as follows: It was an overhead tank, and there was a box conveyor that took the fruit up and dumped it into this tank, which was probably 4 feet wide by 15 or 20 feet long, and probably 3 feet deep. It was full of water. And he put borax solution, or borax, in the water; and there was an elevator took the fruit out of this tank onto the brushers, soft hair brushers, and from there onto an absorbent towel, and from there into a drier. And there was this pump I mentioned about. Also he blew heat over this drier to dry them. I think there was about two or three places where the hot air came out over this drier to dry them, and then beyond that there was three fans, I believe it was.

The fruit was oranges and grapefruit. I usually put the borax in the tank myself. Sometimes someone working for me [fol. 515] would put it in. The water that was circulated from the pump was circulated constantly through the tank. At night the operation was discontinued. The heat would be turned off, and then the water would be emptied out of the tank. The tank was cleaned out every night, so that every day there was a new quantity of water supplied to the tank, and borax was put in the tank, the oranges delivered into the tank and permitted to stay there for a period of time, after which the oranges were elevated out of the tank. Sometimes we put in some Gold Dust, or some kind of washing powder, if the fruit was dirty. We put it in to clean the fruit.

Q. What was the purpose of putting the borax in the tank?

A. Why, Mr. Morgan had an idea—he had proved it to be so—that it kept the fruit from decaying from blue mold.

Mr. Townsend: I move that that answer be struck out as expressing hearsay, and expressing the opinion of another party.

By Mr. Graham:

Q. What could you say from your own knowledge, from the use of this borax, as to the effect it had on the fruit?

A. Well, their records showed that they had less decay than the other houses in that district.

Mr. Steward: That answer is objected to as secondary.

I know of my own knowledge that these other houses referred to were not treating their oranges in the same way that I have described, but was used by Mr. Morgan.

This apparatus that I have described for treating the oranges was located near the center of the house; or not in [fol. 516] exactly the center. It was sort of in the northwest part of the house. It was open to inspection by anybody passing there, so that they could see it. Anybody coming in the house could see it. And there was no attempt at secrecy about this process that we were using. I do not know of my own knowledge where this borax was purchased. There was always a supply of it there in the

house in package form. I think that we ran out once, and I, myself, got some borax up at the grocery store in Rialto. We usually get everything, that is, Mr. Morgan would buy everything, through the Fruit Growers Supply Company; and of course sometimes we would run out, and rush up to the store to get things.

Q. So that you made it a point not to put any of the fruit through this tank unless you had the borax in it, is that right?

Mr. Townsend: That is objected to as leading.

A. Yes; that is right.

By Mr. Graham:

Q. Then during your employment with Mr. Morgan over the period you have testified, it was the common and usual practice to treat all of the fruit in the manner that you have testified to, is that correct?

Mr. Townsend: That is objected to as grossly leading.

A. Yes, sir.

Cross-examination:

The packages in which the material I added to the tank was contained were ordinary packages like washing powder comes in. I suppose they were that tall and that wide. I expect they would weigh anywhere from two or three, maybe,—I don't know—maybe probably five pounds. They might go up that high. I don't remember definitely what [fol. 547] the weight was. In adding the material to the tank I would break a package open and dump it into the tank. It was a pasteboard package. I would tear the corner off. Tear the top out. I presume the package had a label on it but I never paid much attention — it. I don't recall at all what the label said. The name of the grocer that I bought the packages from occasionally was Reisinger's Grocery and Market. I put the package of material in the soaking tank the first thing in the morning; then at noon we would add some more. As a rule we put in a package of a morning; then at noon when we would start

in we would put in two-thirds of a package, or sometimes a whole package, and that ran us the full day and then at night, we emptied the tank and cleaned it out thoroughly. The water that was used in this soaking tank we got from the Rialto Domestic Water Company. They have a water system there, you see.

The fruit, after passing through the tank I described as being from 15 to 20 feet long, was carried by an elevator to some kind of a washing machine. There were four soft hair brushers, about 8 or 10 feet long, 10 feet I think, which carried this fruit from this elevator to a towel—I can't recall the name of it now—an absorbent towel, and it would take off some of the moisture off of the oranges. These brushes 8 or 10 feet long, were arranged parallel with each other. There was a kind of a fruit runway between each of these brushes. There were three runways and four brushes. And these brushes rotated.

Q. Was fresh water sprayed on the fruit as it passed down these runways?

A. There was a very light spray went over the oranges.

Q. There was some kind of a spray pipe, or a spray pipe for each runway?

[fol. 518] A. Yes.

Q. A perforated pipe that showered the plain water down on the fruit?

A. Yes.

Q. Those pipes sprayed water on the fruit the entire length of each runway, I suppose?

A. Well, within a few inches, yes.

Q. So that the oranges or the grapefruit, or whatever it was, going through, were thoroughly rinsed off with fresh water?

A. Yes.

Mr. Graham: I move to strike out the answer of the witness on the ground it is a conclusion.

By Mr. Steward:

Q. Do you remember the color of the labels on those packages you have referred to, Mr. Wood?

A. No.

Q. Are you certain whether the material contained in those packages was borax or a so-called borax washing powder?

A. They called it borax.

Q. Who called it borax?

A. Mr. Morgan.

Q. Are you personally certain whether it was borax or a borax washing powder or soap powder?

A. Why, it was—I don't know.

Mr. Morgan's house handled lemons. Those lemons were not run through this same machinery unit I have described. That is one district that don't wash the lemons. That is the only district I know of that they don't wash them. So they never ran them through any solution at all. They just simply hand-sorted them in the basement. There was a house there that attempted to treat the lemons for decay prevention but they had more fruit decay by wash-[fol. 519] ing them than otherwise. Mr. Morgan's machinery was not adapted for lemons. You see, the lemons is somewhat of a side issue in most of those houses. They don't have any lemon machinery for handling them. They always have heavy decay in the lemons. I don't think Mr. Morgan had any lemons of his handled through any other house.

I know that this packing house of Mr. Morgan's was built in 1916 because I was living there at the time, and on the front of the house there is the year it was built, the name of the house and the year it was built, and the year is 1916. I was then working for the Rialto Fruit Company located next door east. The manager of that house was Bert Stephens. That packing house was about 12 feet from Mr. Morgan's Packing house. I was working at this Rialto Fruit Company's house five or six years. I had had experience prior to that for quite a nummber of years, here and there and everywhere, you might say. It is pretty hard to remember all of the different places I have worked, and the period I worked, and so on. I worked for the California Citrus Union, and the Rialto Orange & Lemon Association, the Growers Fruit Company, the Randolph Marketing Company, the Stewart Fruit Company; the Rialto Orange Company; and I guess that is about all. I worked

for the Rialto Fruit Company prior to 1916, but I worked for them with the exception of a short time that I was with the Randolph. During that period, 1916 to 1918 or 1919, I was with the Randolph Marketing Company for four or five months during the period of 1916 to 1918 or 1919. And it was in 1918 or 1919 that I first worked for Mr. Morgan. And that was the first time I worked for Mr. Morgan as assistant manager.

I believe I made boxes and packed for him prior to that, a number of years before that. At that time Mr. Morgan's house was on the Santa Fe right of way at the end of Palm [fol. 520] Street, I believe it was; yes, it was at the end of Palm Street. It was directly west of the site of the new packing house, which he built in 1916. Right alongside it. I do not know what method Mr. Morgan was using for treating fruit during that earlier period when I worked for him in making boxes.

During the period when I worked for Mr. Morgan in his new house, he used bluestone or copper sulphate for cleaning dirty boxes. I don't know whether he used it for any other purpose or not. I don't think that he used any of this in the soaking tank through which the fruit was run. I noticed it in the separator tank, but I don't recall of seeing any of it in the soaking tank. On a frost year they use a separator, to separate the good from the frosted fruit. I don't know as he used bluestone for that, that is, when he was running the fruit through, but he had a sack of it at the side of the tank when the boys were washing boxes. You see, in storing the lemons he would have a good deal of decayed fruit, and it wouldn't do to send those boxes out in the field dirty to bring in fruit. So he would have them washed, and cleansed, before they were sent out. I presume that the bluestone was used as a disinfectant, and to help cleanse the boxes. The chances are it would help to prevent infection and decay.

I don't think I ever worked directly for Mr. Morgan making boxes. There was another fellow had the contract, and I would help him out occasionally when he was snowed under, as they say. I don't remember who he was now. The work was done in Mr. Morgan's packing house. I don't know where the soaking tank was located in that

house although I presume I walked around the house. I don't know how long I was employed at that house making boxes. It might have been less than a month. I didn't make very many boxes for Mr. Morgan. I think I was working some place else at the time, and just simply went [fol. 521] over there to help out at various times. I had had previous experience in making boxes elsewhere off and on for seven or eight years. When a fellow works around a packing house he gets so he does most anything, pack, make boxes, label, or anything that comes up. For a number of years I had been accustomed to being in packing houses and seeing the operations on the fruit there.

Mr. Morgan was and is very particular about the handling of the fruit in his packing house. He would caution his pickers about bruising fruit and handling it. His pickers did not wear gloves. They used sacks into which the fruit was put when they picked it from the tree. I don't know whether he had anyone to supervise the picking, to see that the pickers were careful. I was never out in the field, but I have always been told that he was very particular about the picking, and so forth. I don't know, but it is my understanding that he used every reasonable precaution to prevent bruising the fruit, or cutting it, or abrasing it in any way. To prevent injury in the packing house he used up-to-date machinery; he used the hot water and the borax, and was very careful about the sorting and grading. He tried to avoid bruising or bumping the fruit. Anyone would do that. And the employees had instructions to be careful. He was considered an exceptionally careful handler of fruit at the time I was with him. No more than usual precautions were taken in shipping the fruit to prevent decay after the fruit was packed. The fruit was packed and lidded and trucked into the cars and loaded on end, with strips between them. I presume that refrigeration was used while I was with Mr. Morgan. But that wasn't my end of it at all. They always refrigerate fruit in the summer time.

[fol. 522] Redirect examination:

The packages of borax which we used were 9½ or 10 inches tall, 4½ or 5 inches wide, and slightly narrower in

the other dimensions. The material that I emptied out of these packages was a powder form, as near as I can remember.

The water used in that tank was obtained from the water company here. It was very good water. They are considered as having about the best water around the country through Rialto. It comes from the mountains springs up in the mountains, from Lava Creek Canyon, and it is very pure, clear water. It is soft.

It is common practice to take precautions in handling the fruit so as to prevent injury to the fruit, abrasions of the skin, or other mechanical injuries to the fruit.

The Reisinger Grocery and Market went out of business a number of years ago.

Recross-examination:

They sold out. The name of the present owner is Downing's Grocery and Meat Market.

The treatment which was given the fruit in the soaking tank at Mr. Morgan's house, when I was his assistant, cleansed the fruit properly. When it was necessary, if the fruit was dirty, we had good suds in the washing tank. When the fruit was dirty we would put in Gold Dust or some washing powder, to take off the dirt or scale. They are subject to black scale in that district, and it is pretty hard to come off sometimes, you know; and in that case we would use some washing powder to cut the dirt.

I am not a chemist. I never analyzed that water, which was used in the Morgan house. I have no idea as to what its actual constitution was, as regards hardness or softness.

[fol. 523] Re-redirect examination:

I have had experience with hard and soft water in washing my hands, and the use of soap, in which I would notice whether or not the water was hard or soft. And I had no difficulty with the water that is supplied by this company at Rialto.

A. J. DAVIS

A. J. DAVIS, of Corona, California, called as a witness on behalf of the defendant, being first duly sworn, testified as follows:

Direct examination:

I am a fruit grower and packer, fifty years old. I have been there in Corona twenty-two years in the fruit business. I had some experience before I went there, but very little. I was connected with the A. F. Call Fruit Company up until 1913, and since that time I have been in business for myself. When I was with the A. F. Call Fruit Company at Corona, I was packing house foreman, having charge and supervision of the operations of handling the fruit in the packing house.

The first year I worked there there was no oranges washed, and I wasn't foreman when I first started in there. I was just an ordinary what you call fruit tramp. And after I had been there one year I was made straw boss. And his fruit, that is, Call's fruit, probably like everybody else's, had a lot of decay and wouldn't carry to market. And he made me a proposition that providing I would ship his fruit with a certain percentage of decay he would give me an increase in salary. Being familiar with curing meats, in handling borax in curing meats, I didn't see why it wouldn't prevent blue mold decay in oranges or in lemons, more especially oranges. At that time the new [fol. 524] oranges hadn't been washed, or wasn't being washed. So I prepared a tank that would hold about fifty gallons to mix this with. I got some borax, and I used lye and Gold Dust in mixing this solution. But I found after we had got a certain percentage of borax in the tank in cold water, after we heated this particular little tank, and after we put it in cold water, it would go back to crystals; it would crystallize. Then the next year we bought a boiler, and we started to heat the water, run live steam from the boiler into the tank, and we kept the temperature around 115 to 118. We had to keep it that temperature in order to keep the borax from going back to crystals, if we used any quantity of it in the water.

At first we had a separate tank to mix the solution in and then take it out and pour it into the washer tank, a

regular submerged washer, a Stebler washer. And it was in this Stebler washer that the cold water crystallized the borax. We probably changed the water in the tank every other day, unless the fruit was real dirty, very dirty. Then we would change it every day. But if it wasn't too dirty we would probably only change it every other day. Steam was introduced in the tank, in the way of live steam from the boiler, run in probably through a half inch or three-quarter pipe, protected to preserve or keep the steam from evaporating, as much as possible, or the heat getting away. And we would start to probably heat that water in the morning—we had a night man there—probably about five o'clock in the morning, and we had to heat it probably a couple of hours to get it up to the proper temperature before we would start to wash in the mornings at seven o'clock; and it kept one man busy taking care of this boiler and looking after this steam, to keep the water up to the required temperature.

It was in 1907 that we made the installation of the first tank in which we mixed the borax and then dumped it into [fol. 525] the other tank. In 1908 we put the borax directly into the washing tank and put the live steam into the washing tank. That was in the Call packing house located in Corona, Riverside County, State of California. I left the employ of the Call packing house in 1913. Our practice of washing fruit in the Call packing house from 1908 to 1913 was to use a certain percentage of borax, that is, borax and Gold Dust, in washing oranges with hot water.

My agreement with Mr. Call that my wages should be raised was not in writing. It was carried out. He didn't only pay me $25 a month additional that he agreed to pay me, but he paid me $75. The results of this washing of the fruit with borax were very good. We shipped approximately 98 per cent. of the fruit without decay, that is, less than 3 per cent. In those days, if a man would have 3 per cent. decay, he would say he didn't have any.

After 1913 we moved out in the country there, where our present packing plant is. At that time it was called the Call Lemon Association, and I was a stockholder, and I was a manager and part-owner of the corporation. Since then it has been changed to Charters & Davis, the corporation name. The business of that concern under the old name

and under the reorganization had to do with oranges and lemons.

We had a regular Stebler washer installed, the same as we had below, and a hot water plant installed there. The Stebler washer is supposed to be a standard submerged washer, with hair brushes. It is a circular washer. The only difference in this washer that we have and the regular washer that Stebler puts out is we have a row of circular brushes on the inside, that is, to protect the fruit from going up against an iron railing he has there; and we put in hair brushes there, which Stebler does not install himself. The fruit is dumped in at one end, where there is a [fol. 526] tank there probably six feet long and about four feet wide, and it comes into a circular, round proposition, and it comes in on your right; your fruit comes into the washer on your right, and comes out on the right, goes over your belt, and it is picked up and put in boxes, going through a series of brushes submerged in the washer. This is all in the washing tank where we have this solution. Probably some of the fruit is not in the solution in there over half a minute, maybe a minute, and some of it maybe ten minutes. It doesn't all get out at the same time. A man dumping in—maybe some of the fruit stays in there probably half a day. You can very easily see that if the water is hot, because it will break the cells down if it stays in there too long, if you have a strong solution of it.

By strong solution I mean anything stronger than one per cent up of borax. We have demonstrated this year—this year might have been a good year, that you can get fair results with a one-half per cent. solution. You can get good results with a one-half per cent. of borax solution, because you can take our records of our packing house of 210 cars, and you won't find over 5 cars that run as high as 3 per cent. decay in the entire shipment. We used a stronger solution than that in our early experience, but we found that we could get—that is, if your fruit was good solid fruit when it come from the orchard, we found we could get just as good results with one-half of one per cent. solution as we could with a stronger solution, and we didn't run a chance of spotting the fruit or damaging it.

After the fruit comes out of this washing tank it is stored in boxes probably for twenty-four hours, until it is dried.

We have no drier there to dry it when it comes out. It is just taken directly from this washing tank and packed into boxes and trucked into the packing house until it is dry, and then run over the packing table and packed up and graded.

[fol. 527] The first borax we bought was in small cubes. The first we used was starting in 1907. We mixed that in a special tank, and cooked it, put it in cold water, and then it recrystallized again after we got a certain percentage of it in there. We used the chips and we also used the ground borax in sacks, that is, since 1917. At times, we used other materials in that washing solution. We had a special soap powder made. It contained from 10 to 20 per cent. borax, which we used in our washing tank. We are having that made today. I was present there at all times, and in the early days did most of the mixing myself of the solution, when we first started. So that I know of my own knowledge just what was used and just how it was used. Later on it was handled by a man that I had in charge of the washer.

The first borax we purchased from the Los Angeles Soap people, the old Los Angeles Soap Company, as near as I can remember. I think they went out of business in 1917 or 1918. We purchased the stuff after we moved out there, that is, in Corona, from the Los Angeles Soap people. I was trying to find those records, and I found some of the freight bills in 1917.

The crystallization occurred in the washing tank itself at any time after the mixing, if you heated the water to a certain temperature, after you got a certain percentage of borax in there. We have had that happen, that is, it would come out on the belt when you would get too much in, and you would find small crystals on the belt, which would come out of the washing tank.

We bought some borax from the Pacific Coast people.

I don't know whether it was in 1919 or 1920 some representatives of the Brogdex Company were in our house there, and packed up and treated a box of fruit, packed it up. As near as I can recollect—I don't remember the man's name—he came there and said he had a system of treating fruit [fol. 528] with borax, and also with paraffin after it was washed in borax water; and he packed up half a box, treated a half a box of his own fruit, and also packed a half a box

of our own fruit, and stored it in the office there, and it stayed there I think for ninety days. And that was boxed up, tied together, and shipped into Los Angeles here somewheres. I don't know exactly where it was shipped, but I can find out, I think. I think it was shipped to the Stewart Fruit Company's office, and they delivered it somewheres, but where it went to I couldn't say. He treated a half a box with his treatment, after it was washed in borax water, we using a small percentage of borax at that time, probably a one per cent. solution, and then he treated it with his paraffin treatment to see what the shrinkage would be. And of course the temperature in the office there was probably 65 or 70. It wasn't kept in any cool place; it was warm in there. But as far as the decay is concerned, there wasn't any decay in either one of them, and as to the shrinkage, I don't think you could tell any difference in either box in the ninety days.

One of the boxes came right from the washer, and was just washed in the borax washer. That was our own treatment. And then they put on their treatment, to show us the difference, what the difference would be in a certain period of time, in shrinkage or decay. That was the only object I could see. The fruit was just washed in borax water, with about a 1 per cent. solution. The Brogdex fruit was washed in the same water, only treated with paraffin.

Q. Do you recall a conversation that you had with this representative when he came to you, with reference to making this test?

Mr. Townsend: We object to the conclusion of the witness that any party he talked to was a representative of the plaintiff. There is no proper foundation laid for this [fol. 529] question. He doesn't even know to whom he spoke.

By Mr. Graham:

Q. You testified that you didn't know this man's name. Did he represent to you that he represented the Brogdex Company?

A. Well, I don't recall his name, but I think my associate in business can verify my statements. He saw the fruit. Not only did he see the fruit, but Bill Stewart saw it.

Mr. Townsend: I move that the answer be struck out as hearsay and an opinion.

Mr. Graham: Will you read the question again, Mr. Reporter?

(Question read.)

A. Yes.

Mr. Townsend: Objected to as hearsay.

It wasn't hearsay. It was an actual fact, because he was there and told me he represented the Brogdex people. And I don't recall his name. I didn't put his name down in black and white, because I wasn't interested enough to take his name.

I told him that we had been using borax for years in our wash water, and as far as the paraffin end of it I didn't think it was worth anything, not to us; that we would be willing for him to pack up a box of fruit and leave it there, and we could soon tell the difference in the decay. There was no secret about our use of borax from 1907 to the present. I suppose everybody, in fact I know that most everybody, knew we were using it.

Mr. Steward: That is objected to as being a conclusion on the part of the witness, no foundation having been laid for any such statement.

[fol. 530] The tank was right there where everybody could see it.

Mr. Call is dead.

Cross-examination:

The washing preparation that I am having made up for myself now is called "Davis Special" by the Western Soap and Chemical Company, the makers of it. They have been in business about seven years, I think, those people. Their address is 4726 Loma Vista Street, Los Angeles. It is a corporation. They will make you up any kind of a soap powder you want. This "Davis Special" powder which I am using contains borax. It is not a secret formula. It contains probably from 10 to 20 per cent. borax, with a portion or amount of tallow to make a good soap out of it. And the other ingredients—I don't know what is in it. I

have been using this particular powder t... years. It has been made for us by this Western Soap & Chemical Company for the last two years. We had some made in 1917 by the Los Angeles Soap people, the people that went out of business. The formula as the Western Soap & Chemical Company are supplying the powder to us today is the same as it was in the beginning, when we first had this powder made up. They haven't changed the formula at all to my knowledge.

This "Davis Special" powder is not being made for us alone but for the public generally. There are other people using it besides myself. There are several houses in Anaheim use it. Bradford, I believe, is the name of the house, that is, their representative told me they were using it down there, and they had more on hand than they could use and wanted to know if I could take it off their hands. That was along the first of this year. That is how I knew they were using it down there. I cannot give you the name of that Bradford house more exactly—only the Bradford [fol. 531] Fruit Company, or I think it is the Bradford Fruit Company. I think it is located in Fullerton. I am not sure about it. I can find out from the representative, or these people that make the soap powder. I don't know what other house at Anaheim has used this powder. He said they were using it down there, but I didn't question him about the houses. I know only what he told me. He told me they were using it there.

That "Davis Special" is the only material we have been adding to the wash water in our packing house to stop decay for this last year. Up to that time we used some borax we bought from the Pacific Borax people in sacks, that is, ground crystal borax.

The first borax we ever used was in cubes. We bought it. It came in barrels. It was in cubes, small cubes, about as big as the end of your finger. That is the way it was manufactured. It was a regular chip, and it was in little round cubes. It wasn't exactly round, but it was kind of square. I don't know whether you would call it soap chips or not. It didn't look like the soap chips we have today, or like the soap chips that the Pacific Borax people make. It was different from that. It was not like the soap chips

we have been buying from the Pacific Coast Borax Company today. And it wasn't all the same size. They were different sizes. They wasn't molded into molds. It had a little rough feeling about it. It wasn't slick, by any means. I don't recall the trade name. It was called borax, so far as I know; borax chips. We bought it from the Los Angeles Soap Company. That was in 1907. And in later years we bought these borax chips, or some of it, from the Pacific Coast Borax Company.

I consider that this "Davis Special" powder we are using and have been using for some time past is effective to stop decay. It is easier to handle and cheaper to use than the other borax preparations we used in former years, and I can't see but what we didn't get just as good results [fol. 532] with the—it wouldn't figure hardly one-half of one per cent solution. In fact, our records show we got just as good results maybe in the fruit itself. But we have had very good results.

As a practical matter we are controlling decay just as well by the use of this "Davis Special" today as we were years ago with those other borax preparations. There is no doubt about that, and our packing-house records will show it.

The washer we are using at the Charters-Davis house is the same type we were using when I left the Call house, except the inside row of brushes are on the inside where that steel circular band runs around. There is a row of hair brushes on there, and that is the only difference.

It is the standard type of lemon and orange washer, lemon and orange in combination of the usual size, except the runway I spoke of is larger, you see. By lowering or raising the brushes you can wash anything in it, grapefruit up as big as 36's.

We made up this solution in the washer when I was at the Call fruit house in a small tank we had, that is, for the first year. We put the stuff in there, and then cooked it. We had to dissolve it.

We had no set rule to go by. We put in enough until we satisfied our own selves that the solution was what we wanted. We didn't have any particular figure to go by at all. We just guessed at it, that is, in making the solution.

And then when we had the solution made up in the mixing tank, we dipped it out from that into the washer tank. We would dip the whole tank out, probably fifty gallons we would have in there, and we would have fifty to seventy-five pounds of the material in there. That is, all ingredients put in there were about fifty to seventy pounds.

[fol. 533] We didn't keep any exact record of the pounds that we used. It would be hard to determine, the exact proportion of borax chips and Gold Dust. You see, we put the Gold Dust and the lye with it, in order so it would cut the dirt also.

Later, when we put the materials directly into the washer tank without mixing them up outside, we followed practically the same system in judging for ourselves that we had enough in there, and sometimes we got too much. Then we would have a soapy condition, and we would have to wash the fruit after it came out.

It was so soapy that it would show up on the fruit after we got through. The soap would show up with the borax. It would leave a white powder on the fruit after the suds dried. We would sometimes get too much in there, you see.

We used a ten-pound bucket to measure the borax chips and the Gold Dust into the washer tank direct. We would take a ten-pound bucket full of the materials and throw them in.

We probably used two buckets of the Gold Dust to one bucket of borax, or vice versa. It all depended on the condition of the fruit. Two buckets of Gold Dust to one bucket of the other, and vice versa, would be only thirty pounds. We would probably put in twice that amount to 800 gallons of water, in the washer tank. That was the mixture we would use to wash the fruit with. We varied the amount in accordance with the condition of the fruit, depending upon whether it was clean or dirty, or the atmospheric condition when it was picked. Say, for instance, we had a rainy spell and there was at times more or less clipper cuts and bruises when the fruit would come into the house, and if it was rainy you would have more blue mold than you would if it was absolutely dry and good, clear weather; [fol. 534] and you had to take all of those things into consideration in washing the stuff.

They use smudge pots in my community for heating the lemon orchards but not the orange orchards. You might find an orange orchard just in some locality that they smudged, but it is rare. It doesn't get cold enough to smudge oranges. That makes the fruit pretty dirty, where you smudge, and it is very difficult to clean.

Somebody came to me about 1919 or 1920, representing himself to be a representative of the Brogdex Company. I fix the date by the fact that Mr. Howard was working for me at that time, that is, it was about the time he had started to work for me. Eugene Howard. He was in here. He came in here with me. He is the gentleman who was sitting over there. I think I am right about that date, but to be positive—I could give you the exact date but I haven't got it here. I wasn't asked about that record. To the best of my recollection, it was 1919 or 1920.

In testifying to the other facts I have given you here, I am also relying on my recollection.

A Mr. R. L. Willitts took charge of the Call packing house when I left there, and he has been there ever since. He is still in charge, yes, sir, of the Call packing house, I don't think he is an officer or director of some kind in the California Fruit Growers Exchange. He may be a director in the Supply Company, in the Fruit Growers Supply Company. I don't think he is an officer in the Fruit Exchange. In fact, he doesn't represent the Exchange in Corona. A man by the name of Miller—Fred Miller—does, I think.

The only thing that I ever said to Mr. Willitts about this borax matter was to ask him if he could look up those records down there when I was there. That is the only thing that was ever said about the borax. He didn't know I [fol. 535] was going to testify in this suit. He didn't know anything about it. I never even mentioned it to him. In fact that was before I knew I was going to testify. Mr. Wadsworth asked me to testify here.

In the early days at the Call house I used to mix up the materials which I put in the washer tank. And later on I had this done by the man in charge of the washer. A man by the name of Kelly, A. P. Kelly. He is a man about eighty-two years old now. Nobody else ever did that mixing. Nobody but Kelly and myself, except the last two or three years I have had a man, or a Mexican boy, that has been

doing the mixing; that is, there is no mixing to it, but just putting it in the washer.

We got the water used at the Call house from the Corona City Water Company, the same supply from which I take water now in my house there at Corona. It is pure water. There is no alkali or salt or anything in it.

The method of fertilizing fruit has an effect on its keeping qualities. You take a nitrogen-fed tree and your fruit is going to be punky and poor-keeping, because you take—that is an excessive amount of nitrogen, and the tree grows so fast it doesn't have time to pick up the other plant food elements, say iron, sulphur, and potash, and naturally the fruit is weak and it is poor carrying stuff, and you can wash it with anything you want to, and you won't get a good carrying quality fruit. I have demonstrated that to our own satisfaction. It shown up in the good keeping qualities of my own fruit so that there is no question in my mind that our method of fertilization has reduced decay very much in our fruit. We are getting good results; probably a little better than some of our neighbors. In fact, we made money on lemons this year, and I don't think any other house in the State did. Due to that fact, I think.

[fol. 536] There is probably 50 per cent of our oranges went into refrigeration; no lemons. That fruit goes vented. Most of the houses in the summertime ship lemons under refrigeration, that is, yellow lemons, that is, what you would call tree-ripe lemons. There is a certain percentage of them get tree-ripe. If your tree is underfed it is like an undernourished kid; it doesn't grow and produce good fruit, and it has a big percentage of tree-ripe lemons. When we have them we ship them under ice. I would like to state that is one thing we figured if the Brogdex would prevent decay it would prevent decay in tree-ripe lemons, which it won't. We have always had a lot of trouble with decay with tree-ripe lemons. Not only ourselves, but everybody else. If anybody could invent something that would prevent tree-ripe lemons from decaying, he would have the world by the tail; I can say that. There is nothing else yet that has been found that will make them keep, because the life is gone. You can put coal tar or anything else on them, and they will be rotten when they get to market; that is, the biggest percentage of them.

Redirect examination:

Our packing house, the Charters-Davis Company, does not handle and ship solely fruit of our own production. We have outside fruit, that is, some; not very much. We have the Earl Estate oranges, and we have fifty cars of outside lemons.

The people in Corona do not generally use the same kind of fertilizer that we do. We started to use Pennywell's mineral compost in 1920. That is a material with a lime base, carbonate of lime, with 400 pounds of phosphate rock, 100 pounds of treated sulphur, with a sulphur fine bacteria, and that is sold as Pennywell's mineral compost. The phosphate rock and the sulphur form or make, when they put it in the soil and the moisture comes in contact with it—it pro- [fol. 537] duces 800 pounds of actual sulphuric acid, and it breaks up the soil, and it releases the iron and potash and other elements that it takes to grow good fruit. Also there is a nitrifying bacteria that goes along with it, and it takes that nitrogen from the air, that is, in growing cover crops. We have to grow a cover crop along with it in the winter time, and in the summer too, if we have plenty of water. We have used that on all of our groves except one twenty acres where we pack the fruit, but we don't do the cultivation and fertilization. With the other groves we do. I don't know what other groves use that we ship fruit from. I know this one particular grove we ship fruit for uses commercial fertilizer.

We have used "Davis Special" for two years. Prior to two years ago we used soap that was put out by the Los Angeles Soap people, and also—I can't recall the name, but it was shipped to the Santa Fe warehouse through the Exchange at that time. We were shipping our fruit through the Exchange. We started to use it in 1915. We used some boric acid in 1920 in addition to the soap.

The borax that we received or had shipped to us in bags was ground in small chip form. It was about the size of sand. It wasn't what you would call real fine, in powder form. It was coarse.

I think it would all come under the head of chip borax, anything that is not finely ground. The cubes were in coarser form than the regular borax we have been getting the last four or five years. A cube is something like a cube

of sugar, only it is smaller. Some of it probably would have square sides, and some of it would be round. Simply lumps, lump borax. You can call it that. I don't suppose it was run through a mold, but it wasn't uniform in shape.

If fruit came in that had been badly clipper cut, we would use a stronger borax solution. We would add more borax [fol. 538] to the solution. We probably might one day double the amount of borax with the washing powder, and maybe the next day we would use double the amount of washing powder with the borax. But this reason I stated there we have an inspector there to inspect so many boxes of fruit of every picker in the field every day, and if we find an excessive amount of clipper cuts, maybe we would change our wash or the solution. The average amount of borax that we would put into the tank every day ranged from 60 to 70 pounds.

We would change the water every other day, unless the fruit was very dirty. We would put in borax in the morning, and then put it in at noontime again. It won't last. You can put a certain amount of borax in there, and it wouldn't last all day. You would have to put in more, because it would soon wear out. It would be just like pouring oil in an automobile. We put in about from sixty to seventy pounds at a time, twice a day, morning and night, in the same tank, in the same washer tank. When we found the fruit coming to the packing-house was excessively clipper cut we increased the amount of borax, so we would get a stronger solution, in order to close up the pores or the mechanical injury of the fruit to prevent the decay.

Q. That is this blue mold decay you have spoken of?
A. The blue mold decay, yes.

Mr. Steward: The last question is objected to as very obviously leading.

Mr. Graham: I will ask the witness what he refers to, then, in his preceding answer, where he said to prevent decaying. What do you mean by that statement? What kind of decay?

A. Well, blue mold decay. We wouldn't use borax for anything else except blue mold decay.

[fol. 539] Prior to 1920 we used—that is, in the way of nitrogen fertilizer we used sulphate of ammonia, nitrate of

lime, and also nitrate of soda in nitrogen form. That is the material I referred to as nitrogen fertilizer. We used it probably fifteen years.

Q. And what success did you have in treating that fruit, insofar as the inhibition or prevention of blue mold decay is concerned?

Mr. Steward: That is objected to as calling for secondary evidence.

A. We had good success, but not as good as we are having today with a different form of fertilizer and the washing powder we are using, or the solution we are using today.

By Mr. Graham:

Q. During that time, however, you need a stronger solution of borax than you do at the present time, is that correct?

A. Yes, sir.

Mr. Townsend: That is objected to as grossly leading.
Mr. Steward: That is objected to as grossly leading.
Mr. Graham: I think that appears in the testimony.

Q. Did you or did you not, prior to 1920, use a stronger solution of borax than you use at the present time?

Mr. Steward: Objected to as merely reframing a question which has already been leading in form.

A. We used a stronger solution, that is, from 1907 up until 1913, and also during 1918 up until about 1923; we [fol. 540] used a stronger solution than we are using today.

Recross-examination:

I discontinued the use of boric acid, which I used at one time because there is some objection there on account of it is a dangerous thing to use on account of spotting fruit unless you put the stuff there yourself and know exactly what you are doing.

I, myself, put it in part of the time; but if you leave it to somebody else to do it, they will get too much in there, and get the water too hot, and then break your cell down, and you get spotted fruit. We had some trouble that way.

I never analyzed any of these products which I have referred to as "borax," or as containing borax. I am not a chemist.

We never made any written record of the quantities of materials which we added at different times during the day to the washing tank, some fifty or sixty pounds twice a day, but we knew we used it. We have no records at all of the exact amount that we used. I am testifying entirely from memory on that point. I might state that I didn't know I was going to have to testify in a case of this kind or we would have kept the records.

Q. Do you consider yourself the originator of the treatment of fruit with borax, Mr. Davis?

Mr. Graham: That is objected to as incompetent and not cross-examination, and it is immaterial to the issues of this suit, and calling for a conclusion of the witness.

A. I couldn't say that. Probably other people used it before I did.

I did hear of a case of somebody using it for treating fruit but I can't recall it now.

[fol. 541] Re-redirect examination:

Q. Mr. Davis, this material that you have referred to as borax, and counsel has questioned you about on re-cross-examination, when you bought that what did you ask for? What was the material sold to you for?

Mr. Townsend: That is objected to as irrelevant and immaterial, and calling for hearsay.

Mr. Steward: Also for secondary.

A. Why, I asked for borax set in the washing powder. I specified I would like to have a powder that would contain a certain percentage of borax, that is, 10 or 20 per cent. And, of course, some of them objected to making it, because they said the cost was prohibitive to use tallow to make a good soap with that much borax in.

The representative of the Brogdex Company was trying to interest me in the paraffin porcess. I don't think he had anything to say about the borax wash, and I don't think he said very much about the Brogdex. I couldn't recall the

exact conversation we had. I couldn't state what we did have.

E. D. HOWARD

E. D. HOWARD, of Duarta, Los Angeles, California, called as a witness on behalf of the defenadnt, being first duly sworn, testified as follows:

Direct examination:

I am fifty-three years of age, and by occupation, a rancher. I have been connected with the fruit packing business pretty near all my life, ever since I was ten years old. I started in California in 1891 packing deciduous fruit, and after four years I came down and went into the citrus fruit, and I have followed that off and on ever since 1894. [fol. 542] I went to Corona in 1910. I think that was October, sometime in October. And I worked as a foreman for the Queen Colony Fruit Exchange for one year. Two seasons I was with the Randolph Fruit Company, and I think about four seasons with the Corona Packing Association, of which I was secretary and manager; and I worked a while for the Chase plant station, and two years for Charter's & Davis, or Mr. Davis.

I was with the Corona Packing Association house in 1913. That is when it was organized. I was foreman and secretary. I had charge of the work in the packing house. It was under my supervision. We handled oranges and lemons, and we washed them in what was called a Stebler submerged washer; and at that time we were having a good deal of decay, and we didn't know what was the matter. We didn't know whether the decay came from, really what source it came from, whether it was from picking or weak lemons and oranges, or what was the cause of it. And of course, by using that—— We used to store them and the fruit didn't keep, and we were looking for some process to eliminate this decay. The decay came in three or four forms. We had brown rot, and green rot, and inside rot, that is, what we call core rot, or blossom-end rot. Of course our fruit wouldn't hold up in transit, and neither would it hold up in storage on account of the decay. And we didn't know whether it was the washer, or what it was, and we

were looking for some process and to find out what it was. And about that time I met Mr. Davis on the street, and his reports in the office showed that he was getting less decay than the rest of us. And I asked him why, and he told me that he was using warm water and washing them.

Mr. Townsend: Pardon me; we object to the hearsay. Will you caution the witness, Mr. Graham, to tell matters [fol. 543] within his own knowledge and what he did, and not what anybody told him?

The Witness: I was leading up to that. Now, if you understand this fruit business in this country——

Mr. Townsend: Pardon me just a moment. Will you caution your witness to follow the question and follow your lead?

Mr. Wadsworth: Just make your objection at the proper time.

Mr. Townsend: We must object to the hearsay, as it is so apparent.

By Mr. Graham:

Q. Will you finish your answer, please?

A. Well, it was just this way: In Corona amongst the fruit packers and shippers we were all just one family. If one knew anything he told it to the other, if he could help him or assist him in any way, and I felt at perfect liberty to go to Mr. Davis and ask him why he was having less decay than I was. And he told me he was using a process, and he told me what it was, and I went back and tried it.

Mr. Townsend: We move the answer be struck out as hearsay, and also as not responsive to the question.

At that time we were using a Stebler wash tank. We were just using water in it with a solution of bluestone. I didn't make any change at all at the time, or right at that time. But I was having this trouble, and I was looking for something to help me, that was all. After I had, as I said before, talked to Mr. Davis, I went back, and we got some borax, as he said that was what he was using, and we made a light solution and put it in the tank; and we didn't get any results from it that way, because we had no hot water. And I asked my association to install a

[fol. 544] steam plant, and they did so, and with that we seemed to get—or our fruit didn't seem to show quite as much decay as it had. Whether our solution that we used was proper or not, I don't know. I think this was along in the season of 1914 and 1915. Well, no; 1915 and 1916. That was the winter of it. That is the way I figure the seasons. We start in about the first of November, and our season ends the next November, and, our seasons coming two years together, that would be 1915 and 1916; and in 1916 that would finish up our season for that year, and we would start in on another season.

I was with this Corona Packing Association up until 1917, in August. They did not continue to use this borax solution. We had a bad hot spell, and it cooked all of our fruit, and of course we had no fruit to pack, and we closed the packing-house. But we did use it the last time we had fruit to pack.

As far as I can remember, we got some borax and mixed it up. There was a man traveled for Swift & Company came along and sold us a soap powder that he claimed had a certain percentage, I don't remember how much, of borax; and he told us if we would use this we would get rid of our crystallization; and we used that from that time on.

You can't use any kind of a washing powder at all in cold water, but what it won't dissolve; not with bluestone in the water.

You take your fruit when it comes out on the belt, and you will see little crystals on it, and after that has set awhile, then it will be white; and that is not the proper thing.

We didn't know what it was, what was the cause or what effect it had on the fruit, when we first began to use it.

We did not notice the crystallization anywhere else; not after we washed it. The material that showed as a white [fol. 545] powder on the fruit, we laid to this borax that we put in the water. We put the borax right into the washing tank.

After the fruit went through this washing tank it was taken off into boxes, and then dumped right over the sizers. We washed all of our fruit, and put it into boxes, and the lemons we put in the storehouse and the oranges we trucked up to the sizer.

I wouldn't like to say what results we obtained, so far as marketing the fruit or keeping the fruit was concerned, by the use of this borax, but there wasn't a great deal of difference in it at that time, because we had a proposition where we disposed of a good deal of our fruit in very short order; but where the cars were tramped, it would show about the usual amount of decay.

Q. What particular fruit was this, Mr. Howard?

A. Mostly lemons. We didn't have a great deal of decay in our oranges after they were washed in the process.

Q. There was a noticeable difference in them, so far as the oranges were concerned?

A. Yes. If you will just pardon me for a minute, I would like to say this: that the lemons that we were handling were all on run-down groves, and the fruit that was on that it isn't like where they are kept right up, and we probably would have more decay on that account, on account of the dead wood and that stuff in the trees, and it would be hard to say what results we would get. We were different from Mr. Davis. They took care of all their groves altogether, and ours were taken care of by this man and that man, and it made a great deal of difference.

Mr. Wadsworth: Will you read the next to the last answer?

(Next to last answer and following question read.)

[fol. 546] Mr. Townsend: We request that the objection that was made to the last question be inserted before the answer. Apparently the Reporter did not get it down, on account of the witness continuing to speak at the same time that the objection was made, the objection being that the question was leading.

Mr. Graham: Have you an objection there, Mr. Reporter?

The Notary (also acting as reporter): I have no objection.

Mr. Graham: Have you an objection (speaking to Mr. Kennelly)?

Mr. Kennelly (acting as shorthand reporter for the plaintiff): No.

Mr. Wadsworth: Let the record show that counsel for the plaintiff have their own Reporter here, and that their

own Reporter did not hear the objection that counsel has stated he made.

Mr. Graham: Now, will you please go back, Mr. Reporter, and let me hear the answer the witness made when he referred to the difference in the effect on oranges and lemons?

(Record read.)

Q. Now, Mr. Howard, will you please explain further what you mean by the answer just read by the Reporter, in which you say you didn't have much decay in the oranges after they were treated with this solution?

A. Well, because the oranges were marketed in Salt Lake City and around in that vicinity, and of course reports would come back there wasn't any decay in them.

[fol. 547] Mr. Steward: That is objected to as wholly secondary in character, being unsupported by any records.

By Mr. Graham:

Q. If there had been decay, you would have had complaints about it, would you not, in the regular course of business?

Mr. Townsend: Objected to as argumentative.

Mr. Steward: And leading.

A. Yes, sir.

By Mr. Graham:

Q. Prior to the time that you used this borax solution that you testified to, and you have referred to Mr. Davis and what he told you, did you ever observe any operations of treating oranges with a borax solution prior to the time when you started to use it yourself?

A. Only what I——

Mr. Townsend: Objected to as leading.

A. Only what I see in his house, because that is where I went to find out. He told me to come up.

By Mr. Graham:

Q. What did you see? Or where was this place?

A. Up on the Charters-Davis place at Temescal, in Corona.

He had a submerged washer, the same as I had, and he had this hot water in pipes that he was heating it in, and he put in this solution, and he had a tin can there—I don't know whether it was a pound can or a pound and a half—and they mixed this up in a bucket and poured that in there when this was about 90 degrees. It run between 90 and 100 degrees. I actually saw that operation. I think [fol. 548] it was in—I don't know. I am not sure whether it was in 1915 or 1916, but it was in that season. This operation of using borax in the Corona Packing Association house was used openly in the house there. There was no secrecy that I ever remember.

Cross-examination:

This Mr. Davis I have referred to is the same Mr. A. J. Davis who has just preceded me on the witness stand. I followed his directions as nearly as I could orally, as near as I could remember them, only I was handicapped when he told me, and I had nothing to heat them with, and it was quite a time after that until I got the heater.

To add the material to the tank we just took and put it in a bucket and dissolved it, and then put it in the hot water, after it was hot. I don't just remember how much of it we put in. As I said before, I don't remember how much it was. It might have been a pound or a pound and a half, I guess, for about 800 gallons—about a pound or a pound and a half of borax to 800 gallons of water. That is what the tank holds, 800 gallons. I think that was about what Mr. Davis told me to use. Mr. Swift's man told me there was about that percentage of borax in this washing powder. And at that time we had to have the washing powder to get the smut off of our lemons and oranges, on account of the smudging. After that we used the Swift washing powder instead of the borax.

I never had it analyzed. We used just about the same amount of the soap powder in the tank that you used in the borax. We got a good suds in that tank. The tank always had suds right on the top of it, and if it got too warm and boiled a little bit, or anything of that kind, it run over on the floor.

[fol. 549] Redirect Examination:

Prior to the time that this Swift representative came there, I think we bought the borax at the grocery store, bought it in packages. It was white; kind of a white powder.

A. P. KELLEY

A. P. KELLEY, of Corona, California, called as a witness on behalf of the defendant, being first duly sworn, testified as follows:

This deposition of A. P. Kelley was taken at the packing house of the American Fruit Growers, Incorporated, at Corona, California. This witness was noticed for examination in Los Angeles, in connection with the other witnesses examined in Los Angeles, but on the representation of counsel for defendant that this witness was aged and infirm and it would be impossible for him to come into Los Angeles, some fifty miles distant from Corona, it was agreed by counsel for both parties that the examination should be held in Corona, Riverside County, California.

Direct Examination:

My name is Albert P. Kelley; my age is eighty-one, and my residence is Corona, California; occupation at present, nothing. My last employment was about, let me see, it was with the Charters-Davis Company, and I think I quit about the latter part of 1919. I was first employed there, I think it was about March—March. About that time. In 1915. The Charters-Davis Company is located in Corona, California. For just a little while prior to 1915 I was employed by the estate of Mr. Call, after he was killed. That was just before I went to Charters-Davis. But I was first employed by the Call packing house in January, 1908. The [fol. 550] Call packing house is located in Corona, on the Santa Fe Railroad.

For a few months, I don't know just how long, I was working on the washer, picking up lemons after they was washed, off the belt. But after that I had charge of the washing, receiving of the fruit and washing it. I had

charge of the men, to see that they done their work right and handled the fruit carefully, without bruising, or anything of that kind. There is a washing machine, they was run through brushes, brushes both on top and bottom and each side, and washed the fruit, and came out and was elevated up onto a belt, where the men was stationed that picked it up and put it in boxes. These brushes were in a machine, and there was water put in enough to cover them so that they was run through those brushes in the water all the time. I sometimes performed that operation connected with washing the oranges myself. I have emptied the fruit into the washer sometimes when the men were busy and we were a little short, or something like that, for a while, and I looked after the general work around the washer. It was in circular form, the tank was, at one side where you emptied it in, and it came out square. That is about all of the description I can give of it.

Q. Well, is that anything like what is known as a standard washer?

Mr. Steward: Objected to as leading.

A. That I couldn't say, because I don't know what is known as a standard washer.

By Mr. Graham:

Q. How does that compare with the washing machine that they were using at the time that you had your last connection with the packing business?

A. Well, it was about the same.

[fol. 551] Mr. Steward: Objected to as without proper foundation in anything that has been said by the witness.

I don't know how much water the tank held. The water was put into the tank from the water mains, the Corona city water mains. I don't know that it was connected to the tank. It came up and—I really don't think it was connected to the tank at all. It just came up and over one side, and the water went in.

The oranges were received in boxes and they was put in stacks; and I had to keep an account of how many boxes,

and what grove they came from. This is at Mr. Call's packing-house I am speaking of now. And, well, it was the same at the Charters-Davis. And when they was washed they was put through this washer, they went through those brushes, and came up on the belt, and there the men were stationed along, enough of them to keep the thing going steady, picking them up and putting them in boxes. Well, they were set back and trucked away, and put in stacks there until they dried, and after they was dried, then they went to the packing-house.

Sometimes we had trouble with dirty fruit, especially after smudging, the years they smudged, considerable. We washed those oranges, the same way. The oranges that came out of this washing machine were packed then right in boxes and permitted to dry in boxes.

The operation conducted under my supervision, of washing the oranges, when I went with the Charters-Davis Company was the same as I have described. Only lemons generally—well, now, it was a little different with lemons. Instead of that, they were put in what we called the curing room, a room where they stood quite a while. You know, a great many of those are green, or partially green, and in [fol. 552] that curing room they stood, and that was heated a little until they cured ready to ship. But that was the same in the Call house, too,—Call and Charters-Davis.

The water used in washing the oranges was common water out of the mains here, Corona water mains.

Sometimes we used any soap powders. When I first commenced to wash, we used Gold Dust and blue-stone and lye, and after I had been there some time, why, we commenced to use borax chips, that we used instead of the Gold Dust.

I refer now to the time when I was with the Call packing house. That was along in, I think in the latter part of 18—1908, or the beginning of 1909, if I remember rightly.

The borax chips was in the shape of a kind of a soap. That first we used for quite a while came in packages, but after a while we got it in barrels. I know one time we must have got twenty or twenty-five barrels at a time. I think that was some time in 18—1909. It might have been along in the first, or beginning, of 1910. But I can't remember. Of course, I couldn't say positive on that, because I don't remember just what time.

Q. Do you remember, however, that it was shortly after your employment with the Call packing house?

Mr. Townsend: I object to that as grossly leading, and cross-examination of your own witness.

Mr. Graham: I will withdraw the question.

Q. How long after you went with the Call packing house was it that they bought the barrels of borax chips that you have referred to?

Mr. Townsend: Objected to as already answered.

Mr. Steward: Furthermore, objected to as secondary evidence.

[fol. 553] By Mr. Graham:

Q. Go ahead and answer.

A. I don't know as I just got the question. I can only tell that approximately, because I—but I should think it was from a year and a half to two years from the time I commenced. You see, I commenced in January, 1908.

Q. Now, Mr. Kelley, how much of this borax material did you use in that tank and——

Mr. Townsend: Object to the question as leading. If you would use the words and language of the witness, it would be better, Mr. Graham; but to attempt to abbreviate it and suggest——

Mr. Graham: What do you have reference to?

Mr. Townsend: He said that they used borax chips.

By Mr. Graham:

Q. Well, counsel suggests that I use the words "borax chips." How much of this borax chips that you have referred to did you use?

Well, that was different, according somewhat to the fruit, how dirty it was, whether it was fruit that had not been smudged, that took very little, we used less there; but if we had fruit that, in the smudging, had become discolored much, why, we used more. And then I generally started in the morning by putting in about—when we used those borax chips, about ten packages. Well, then, there was—in washing, you know, the water would go down, be carried

out, and we would have to put in fresh water. Well, then, I would put in more chips, according to the fruit we had, so that I—there was no fixed standards to go by. I had to use my judgment on that.

Sometimes we would use just cold water, if the fruit was not very dirty, and we would use cold water, but not often. [fol. 554] We generally heated the water with steam. We had a steam pipe running in. I don't think we used anything else in the water at the same time we used the borax chips.

The use of borax chips continued in the washing operation up to the time that I quit working. We used the same —same stuff up until 1918 or 1919.

Q. Now referring to the borax that you say you used from barrels, what was the appearance of that material?

Mr. Steward: Let me hear that question, please, Mr. Kennelly.

(Mr. Kennelly, the shorthand reporter of the plaintiff, read the last question.)

Mr. Steward: Objected to as a misquotation of what the witness has testified to, and as obviously grossly leading and immaterial.

Mr. Wadsworth: I think the record speaks for itself.

By Mr. Wadsworth:

Q. You may answer the question. Do you understand the question, Mr. Kelley?

A. No, not fully.

Mr. Wadsworth: Will you read the question again, please?

(The reporter read the previous question.)

A. It was a powder, a fine powder, kind of like soap, only powdered, you know.

By Mr. Graham:

Q. Who was in charge of the Call packing house at the time you were employed there?

A. Mr. A. J. Davis.

(No cross-examination.)

[fol. 555] Testimony Taken on Behalf of the Party American Fruit Growers, Incorporated, at the Office of Volusia Growers, Incorporated, De Land, Florida, November 1st, A. D. 1926

Present on behalf of Brogdex Company: R. F. Steward.

Present on behalf of American Fruit Growers Incorporated: W. B. Morton, Esq., of Pennie, Davis, Marvin & Edmonds.

GEORGE W. PALMER

GEORGE W. PALMER, of Emporia, Florida, a witness in behalf of the defendant, American Fruit Growers Incorporated, having first been duly sworn, deposes and says in answer to interrogatories by Mr. Morton, as follows:

I have been living in Emporia since the early part of December, 1905, except that I have been North several times since. My home has been there ever since 1905. I have been engaged in cultivating oranges since March of that spring.

The first oranges that I sold was about twenty boxes to Fall River, Mass. My records also show they returned to me sixteen cents per box. The complaint was that they decayed in too short time. I took no steps to prevent this loss from decay. The first day I was in Emporia I went into both the packing houses of Mr. Felt and Mr. Beers and they were washing—guess they called it "washing"—the fruit in the regular lime-sulphur spray solution in the hope that it might overcome the decay that was then prevalent. [fol. 556] This decay was caused by what they then called "Blue Mold" and "Wither-tip." This wither-tip was a new disease and they were trying various means to overcome it by spraying but nothing of this sort did any good so far as the fruit was concerned. After a few weeks try on the fruit itself these gentlemen abandoned the idea and took the losses as they came, which were right along. That idea of Mr. Felt and Mr. Beers stuck by me until I began shipping my fruit myself, and I had some trouble as I remarked, about decay, and I thought to use something to overcome that blue mold decay and I tried the use of the "standard Bordeaux." This bordeaux is used as a fungi-

cide on a great many farm and fruit crops and I was satisfied in my own mind that it would overcome this blue mold and wither-tip fungus. I still think it would work all right but it left a dark looking residue on the fruit, which was, of course, poison, and I abandoned the idea. I understood the use of borax, more as the use of a bactericide in New York State in the interest of their creameries, etc., where it was used to prevent bacteria that caused loss of flavor in butter and cheese. Remembering these things I concluded that the borax would work on the fruit for about the same purpose and tried it. As I remember it I have used, or did use, a solution of perhaps 2 or 3% Baume to start—it gives the specific gravity—but of course this solution would be strengthened as I washed the fruit put in and added more borax and more water to make up for the loss which the fruit itself would take up. Now, I used this experimentally to start with but became perfectly satisfied in my own mind that this borax solution would prevent decay in oranges or citrus fruit, and experience of twelve or fifteen years bears out this idea.

I have shipped some fruit every year but one year my wife was very sick and in the hospital and I sold them [fol. 557] mostly on the trees to an Exchange man to obtain ready money to pay the hospital expenses. In the spring of the same season I did fill some mail orders for old customers. I never shipped to dealers, not knowing them, for reason I was under contract with the Exchange not to do that. Of course sometimes we were mistaken. So that all my shipments were directly to the consumer.

When I did begin shipping to any extent I made a point with each customer to whom I shipped and wrote that they might charge back to me all decayed fruit received by them. The agents of most dealers, as I understand it, do not consider fruit decayed in the boxes unless over 3 per cent. My understanding with my customers was that they could turn back all decayed fruit under 3 per cent. I will say that probably not half of my customers thought about that or understood it, but I know human nature well enough to know that had there been any appreciable decay I would have heard from it. I never had any fruit charged back to me because of decay. It has always been my policy on anything, that I immediately made it up by check or more fruit

to that customer. I never had any calls for loss on account of decay when it got there.

I have not used that borax treatment with all my fruit shipped to the North. Sometimes, as my memory recalls, I would not have borax and I used washing powder in its place. Later the "white fly" became prevalent in our section and consequently stained the fruit. I found that the washing powder cleaned that fruit more rapidly than did the borax alone. At first I aimed to follow the washing powder solution without the borax solution, packing the fruit directly from the washing powder solution as soon as it was dry. I became fairly well satisfied that the washing powders, which I believe are largely composed of borax, [fol. 558] will in ordinary times answer the purpose of borax, and do better as a cleaner; however, whenever conditions were good, or bad, whichever you may say, for this blue mold, I would use the borax in conjunction with the washing powder.

A great deal of decay in citrus fruit originates in the picking. A careless picker can braise or thorn slightly, and might bruise the fruit enough so that blue mold or other matter might get in the orange and cause decay. Other causes of decay are careless handling all along through the process of grading, washing and packing until the box of fruit is completed. Knowing this, I tried to pick my own fruit myself, as far as I could, and handle it myself as far as I could. Nevertheless there will always be some decay, sometimes much decay, when the season is favorable for fungus unless the fruit is treated. I believe that covers that all right.

Q. Well, describe to us just how you used the borax.

A. Oh, I might say here that I don't remember that I ever washed my fruit in clear water. Sometimes I used borax alone as a preventative primarily and again using washing powder as a cleanser primarily and sometimes both solutions for both purposes, and again later, when I became satisfied that ordinary washing powder was a germicide and fungicide, I would use that alone unless conditions were more than ordinarily bad.

Q. What do you mean, "more than ordinarily bad"?

A. Warm, damp period in the winter, during the winter and especially in the spring tends to produce these fungi.

Q. In washing your fruit what sort of an apparatus did you use?

[fol. 559] A. I used the old-fashioned washtub, but did not use the washboard.

Q. What do you use, a brush or something of the sort to scrub the fruit with?

A. I very seldom used a brush; sometimes a burlap cloth.

Q. Did you use warm or cold water?

A. I intended to have the water comfortable to the hand. I would rather it would be colder than the fruit, than warmer.

Q. About how long did you say you left the fruit in the borax solution?

A. I never timed it but suppose it would be an average of ten or fifteen minutes.

Q. How much fruit at the time would you dump into the tub?

A. About one crate, that is, picking crate or field crate, at that time holding about two bushels, or a little more than that perhaps.

Q. Did you have enough water in the tub to just float that many oranges?

A. I aimed to put just enough to bring the oranges and fruit to the top of the tub and then submerge. It won't submerge anyway. You have to hold it. An orange will float. I will explain that. One layer of oranges in the water will just about float one-tenth out of water, but a whole box of fruit, a crate, would submerge except the top layer. Florida oranges are much heavier than California fruit.

Q. Then how did you dry the fruit?

A. I would take them from the solution into an empty field crate, which are slatted, permitting air to pass through, and if the air was damp I would pour carefully the fruit from one crate to another until it was dry.

[fol. 560] Q. After the fruit was dry would you polish it or give it any further treatment?

A. No other treatment. Just wrapped it.

Q. Just wrapped and put it in the box for shipment?

A. Yes, sir.

I frequently mentioned my process to the Emporia Citrus Growers Association, of which I was secretary and treasurer. I mentioned it to John J. Beers, J. P. Felt, W.

W. Mattison, T. A. Taylor and others. I very seldom got much, if any, encouragement from these gentlemen. Mr. Mattison particularly called it a "Yankee trick." These men had in mind their own experiment which was a failure. The experiment with lime sulphur solution.

Q. Did you ever notice any difference in the behavior of the culls which you took out as compared with those you took out before they were washed and after they were washed in the borax?

A. In handling my fruit I always culled it somewhat before washing and again while packing. The two classes of culls were kept separate. I noticed that when blue mold was prevalent the untreated culls would decay very quickly while the treated culls would hold up for sometimes weeks.

I couldn't tell the average shipment without a little trouble. I can tell it very nearly but I ship from a very few boxes to around three hundred on these mail orders. This difference was generally due to loss of the crop by freezing except as I have already stated, when sickness was the cause. I began shipping my oranges in 1908. Well, yes, I did except a very few in the fall of 1907. I don't exactly remember the first year I used the borax but I can say that for the next ten succeeding years the greater part of the shipments were treated in this manner with borax.

[fol. 561] The following are the names of some of the people to whom I have shipped oranges by mail order, treated with borax: George Lamb, Poolville, New York; Benjamin Beach, Poolville, New York; I. B. Marsh, Poolville, New York; W. A. Newton, Earlville, New York. I also shipped to several parties in Maine. I forget the initials, but one was Aimes, however. I shipped some to Providence, Rhode Island; I shipped some to Chicago, I have forgotten the name but it was a Catholic School and I have forgotten the address. I shipped to W. B. Gibbon, Milleville, New Jersey. I can't possibly recall all of these but those were the principal purchasers. I have letters from Lamb and Gibbon stating their pleasure at the treatment received by me, and the quantity of the fruit and especially its keeping qualities.

I am acquainted with Mr. Burden. I have known him for six years. He is my next-door neighbor, about forty feet from my house, just over the fence.

I have told Mr. Burden about my borax process on the fruit. I think it was four years ago that he hauled my fruit to the depot, and seeing my tubs, etc., made inquiry and I explained the whole theory to him. I may be mistaken about the year, but it was about that time, three or four years ago. He had noticed me using something before that time, but had never inquired as to the real purpose. I also mentioned my using it at a sub-exchange meeting in DeLand about three years ago. I could get the exact date if necessary.

There was some fruit on the table at the sub-exchange room and I asked someone why it was there. They replied that it had been treated by the Brogdex method for the purpose of preserving the fruit without decay. I remarked—no, I asked them if they knew what the Brogdex solution was composed of, and I think it was Mr. Keppler said he [fol. 562] understood that the base of it was just plain borax. I remarked, "That is old stuff, as I have been using borax for years."

My statement did not make any very great impression, or so it seemed to me, and I did not go into further details. Mr. Burden was present at that meeting and remembers, I believe, the incident.

Cross-examination:

The full name of Mr. Burden is Fred J. Burden. He is a grower also having about four acres. Which means about four or five hundred boxes a year, sometimes more, sometimes less than that, of course. Many of his trees when he first came were small, not under full production by any means.

He lived next door to me six years. He has never shipped from mail orders, his fruit always going through the Florida Citrus Growers Exchange, so that his fruit decayed along with others and he was penalized for it. Each grower lost by decay the same.

I started in growing about twenty years ago. I came to Florida about twenty-one years ago coming December. I bought my groves and place in March, the following March.

This year I won't have three hundred boxes. I have had as high as four hundred or five hundred boxes a year, but I did not put it all through as mail order shipments.

I cannot give you any idea as to what portion of my crop was shipped to that firm in Providence which I referred to.

Thirty-four was the largest single shipment, I made to Fisk & Company. I made other small shipment.

I was very careful indeed about handling my fruit so it would get to the customer in good shape. That included the packing when I did it myself. That included the picking [fol. 563] in the grove whenever I picked them myself. I was very careful and the whole process was done with care.

In washing in the tub there is no chance for special care in that case. I did not use a brush, because a brush, unless very soft, would abrase the fruit, and a soft one would not have any effect on the dirt.

I used no machinery at all in handling fruit in my own establishment Two or three times when the orders were quite large I had the fruit hauled to the Association packing house, where I put it through the regular packing house machinery, adding borax or washing powder, possibly both, in the packing house washing.

The Association house, Emporia, Florida, the full name is Emporia Citrus Growers Association of Pierson. We have just liquidated our firm and joined the Pierson Association. That is a member of the Florida Association. Combining the two associations saves maintaining two packing houses, as they are only about two miles apart and in some instances the groves are just as near Pierson as Emporia.

I never could do anything with mittens on, but I was careful not to scratch the fruit and to make sure that my finger nails were short. So far as I could I saw to it that my finger nails were closely trimmed. I have been obliged to hire pickers and they were never as careful as I would have liked, nevertheless I never had any complaint from my customers after I began to use borax.

On those occasions when I ran my fruit through the regular handling machinery of the Emporia Citrus Growers Association and varied the regular practice by adding borax myself, I came out perfectly all right on those shipments—absolutely no complaint. Just as good as with my own home arrangement.

[fol. 564] The soaking tank at the Emporia Citrus Growers Association—now this is purely guesswork, but I helped

install it—was as I remember it, 32 inches wide, 34 inches deep and 12 feet in length.

I never measured the borax added to this tank in that packing house. I might say right now, there is a partition in this tank whereby about one-half of it could be shut off for the reason that sometimes there would be only a few boxes to handle and to soak the whole business would be unnecessary. In this compartment I would put some water —I never measured it—pour in borax until in my judgment I had the proper strength, and put in oranges—all that the solution would cover. I poured in the borax from packages. I never looked at them to see what they weighed, but probably they were one-pound packages.

It is difficult to say where I bought the borax. I bought some through my wife's Larkin Club at different times, and other times at different stores, where I happened to be when I wanted it. I couldn't name the particular stores I bought from. I traded at Astor; at Pierson; at Emporia; Barberville; Eldridge and DeLand.

The Mr. Felt I referred to was a mill man from Emporium, Pennsylvania. Everybody called him "J. P." Josiah, I think it was.

That soaking tank at the Emporia Citrus Growers Association house was a wooden tank lined with zinc or galvanized material. The fruit was gotten out of the tank by an elevator operated by a gasoline engine, in connection with other machinery. The partition sometimes put in the tank was wooden. Not absolutely watertight, as I recall it, but it held for the amount of fruit I handled at that time.

My greatest shipment run through there was eighty-one boxes. The washer was supposed to handle a carload a day. But I only ran eighty-one boxes through at that time—[fol. 565] my own fruit. It passed on to elevator belts and ran through a mechanical dryer onto the grading belt; from the grading belt into the sizer.

The soaking tank is a part of the washer. The fruit is elevated from the soaking tank, perhaps three feet, by a slanting elevator composed of rollers working on endless chains. The fruit dropped from the end of the elevator into the brushes of the washer. These brushes—there are two of them—revolving. They were, in this case, nine feet long, revolving toward each other, the fruit running between

them. In the regular process the fruit while going over these brushes would be sprayed with clear water. Because I did not want the borax solution washed off I took the fruit directly from the soaking tank and placed it on the grading belt a box at a time. What I mean by a box at a time, the grading belt would handle or carry a box of this fruit, poured onto it, one right after the other, in order to keep the grading belt filled with fruit.

When I shipped my eighty-one boxes I did the work myself except what Mr. Taylor, the association president, did just from good nature, and one man, Mr. McMichael, whom I hired. I was, as I recall it, fully two days getting the fruit packed and ready for shipment. I ran it all through first and then packed it afterwards. I neglected to say, however, that when I took my fruit from the soaking tank I did not put it through the drier but put it directly onto the grading belt.

I can't really say how fast I fed the fruit into the soaking tank. My supposition would be about three or four boxes, or five or six crates at the time. As the packing house is usually run there is no let-up in the stream of fruit passing through the machinery, but in my case, doing most of the work of grading and packing myself, there would be many short intermissions.

[fol. 566] Q. I gather from your testimony that you wish to be understood as considering that you made quite an important discovery when you hit upon this method of treament which, I believe you said, you began very soon after you began shipping fruit?

A. I never considered that I had made any real discovery. I was simply adapting the use of borax to this purpose, which is, or may be, one of the many of the uses to which borax was put. Borax being a natural production, I did not consider that it was a discovery brought about by man, or made by man, but that the adaptation of its use could properly enough be considered as an adaption only. Mixed metaphors, perhaps.

I had not heard at that time of anybody using borax, or trying to use it prior to then, for stopping this decay. So far as I know I considered myself the first to use it—

absolutely. I have done inventing in other lines, but not pertaining to this case at all.

About 1896 the milk producers were having trouble about shipping whole milk to the big markets. It was necessary to handle it very rapidly under ice in order to get it through in good condition. The profits of producing milk were so reduced by handling and transportation that the producers were getting discouraged. It occurred to me that if, however, someone could manufacture a can on the double principle vacuum bottom, or non-conductor packing, that the milk might be cooled to the proper temperature on the farm and delivered on the New York markets by local freight and so eliminate much of the expense. I talked with a hardware friend of mine who had already invented a milk ariator and he felt that my idea was a practical one and proposed that we go in halves, as he called it—partnership, in the experiment and get it patented if it succeeded. We were both short of money and of course could not push the idea very [fol. 567] rapidly and before we got one of the cans completed a man at Bainbridge, New York, patented practically the same idea. That is all. We did not look into the question of getting a patent. We saw in the newspaper the fact that this Bainbridge man had patented such a can and we dropped our efforts.

As far as I can remember the milk can idea and thought of taking out a patent might have been simultaneous.

I ceased packing my own fruit as a business two years ago. I am shipping now through the Pierson Citrus Association.

I don't know the capacity in gallons of that tub I used to use for washing my fruit when I was handling it myself. It was one of the larger size of, or perhaps a middle size of metal washtub. It did not hold as much as twenty-five or thirty gallons, I don't think. About twelve, thirteen or fourteen inches deep and I should say about thirty inches across the top, slightly flaring at the top. That is a guess, however. I should presume it might be about twelve or fifteen gallons. Not very much more. I do not know but think the tubs are marked on the bottom. I can't recall what number was on the bottom of the tub.

I wrapped my fruit in ordinary wrapping paper, that is, fruit wrapping paper. Tissue paper. That is, the regular tissue wrapping carrying the Association brand, as I had

that right. We had a private brand called the "Uncle Remus" brand carrying "Brer Rabbit", "Brer Fox" and "Tar Baby". This was a copyrighted brand.

Q. In what kind of containers did you pack your fruit?

A. Regular standard citrus 2¾ bushel containers I think —no one——

By Mr. Steward: Take it all down.

[fol. 568] A. (continued).—give it up. Standard boxes, however. I have one which is marked with the exact capacity, but I can't remember it. I saw it too often.

Q. How did you mix the borax which you say you used with the water in your tub when you were packing your fruit at home, as you have testified?

A. I took a package, cut the end open with a knife, tipped it up and poured in what I thought it needed, trying the solution with my hands until it had the desired feel, and added my fruit.

Q. What kind of "feel" do you mean?

A. It would have a sort of slick, I think that explains it as well as anything. Slick feeling. Borax does not make suds like soap.

Q. About what part of a package did you put in to get the slick feeling you spoke about?

A. To start with, according to my memory, I would use pretty nearly a package—possibly not more than two-thirds or three-quarters. I didn't suppose it was necessary to try to remember it. I have already said that as I kept taking fruit out of this solution I added more water and more borax and possibly, quite likely in fact, the solution would be stronger than I had at first.

I never saw any deposit on the fruit to be noticed. Possibly anyone looking very closely would find some, but not much. I was careful to avoid that. I don't think I ever saw any such deposit on the fruit I sent out. I don't remember that I did.

My tub was located at different places in respect to my house. Sometimes at my house nearest the well; sometimes I found it more convenient to carry the water to the fruit than it was to carry the fruit to the water. Two or three years together I had a shed of rough lumber located perhaps

ten rods East of my house and very near the South boundary of my lot, and hauled my fruit, all of it, there to pack, [fol. 569] and carried the water there to wash it. I used the water from my well. It is the same well I have now.

I did not run my fruit through the drier when I packed certain shipments through the Exchange packing house at Emporia. It dried itself. In ordinary times, in dry weather, by the time it has passed over the grading belt through the sizer and into the hopper or bins it will be dry.

I ordinarily sized the fruit by the eye. That is usually done by machinery. Our machine was the Maull sizer. I am speaking of this Association packing house. When I packed the fruit at home it was sized by the eye.

When I first began growing oranges, I used the usual methods, plowing, hoeing, fertilizing, three times annually. I used what you call "clean" cultivation for one year. I discontinued this method for several reasons, one being the expense, and there were other reasons. My house is situated in the grove. Under clean cultivation every high wind would fill the house more or less with fine dust. I saw "sod" culture of apples in New York State and knew it to be successful there and felt that I could practice the same method here with oranges. Since that first year the front half of my grove has never been either plowed or harrowed. The back half was harrowed occasionally, but not since four or five years ago. I think there is less dirt on the fruit in the sod cultivation, but the principal reason for washing fruit is the stain or smut caused by the white fly.

White fly is a very small, pure white insect which at certain times of the year swarms into the trees, and their excretions drop on the fruit and leaves, producing something like a heavy mold or black scum—I don't know what else you would call it. This stain or mold on the fruit was what brought me to use washing powder as an adjunct to the use [fol. 570] of borax. The white fly started in the Southern part of the state before I came to Florida and gradually spread to cover the entire citrus belt. This insect struck our place about nineteen—I would say about 1911 or twelve. That is a guess. I was not washing any of my fruit before 1911 or 1912. I have already said they were washing it for that purpose with lime sulphur but not for the white fly.

I began washing my fruit for this blue mold with borax in 1907 or '08, but packing houses in our section did not begin

washing very much, if any, until the white fly appeared. I was not washing fruit prior to 1911 or 1912 for the purpose of getting the dirt off. All the open cultivation I did was done after the fruit was removed from the grove, through the spring and summer months.

In one instance, in my book I see I bought forty cents' worth of Gold Dust. I believe in all other cases I mentioned simply washing powder or soap powder. To my mind it all meant the same thing. I did not suppose I would ever wish the name of any of these powders, therefore I did not make any attempt to remember these things definitely. My records were for my own use and my own purposes entirely.

I have heard of a washing powder called "Boraxine." I have used it. I can't tell you the exact date, or even the exact year. My wife ran a Larkin Club and we got some Boraxine at different times, but I do not remember when.

I do not know that I noticed any vast difference between that and borax. I never noticed. I did not use any of it for the express purpose of preventing fruit from decaying. I just said I did not think I ever used the Boraxine for the express purpose of preventing decay.

Remember, the blue mold and various causes of decay in citrus fruits do not come every year, or at all times in any [fol. 571] year. I have covered all of this once before.

I know I used Boraxine in 19—, or not Boraxine, but Borax in 1911, and I think in 1909 and '10, possibly earlier than that. In 1912 most of my fruit was badly injured by cold and I did not ship on any mail orders.

I understand that this particular house through which I now ship my fruit—that is the Pierson house—uses the borax treatment—but wait, I am not sure but know they are planning to.

The name of that house is Pierson Citrus Growers Association. It ships through the Florida Citrus Exchange. I am not sure, as I just said, that they are using borax at the present time, but they are considering it because last spring I was one of the directors and it was talked over last spring, but whether they have gone on with it I cannot say.

I don't remember that I have received any decay reports on any fruit I have shipped.

Q. Do you ever remember making any statements inconsistent with what you have just said regarding decay?

A. I am referring to my former statement now; I said that the shipments to Fall River brought sixteen or seventeen cents a box because of decay.

That was about 1907 or '08.

H. B. Fiske & Company reported some decay. As I remember it was as high as 12 or 15 per cent. That was just about the time, or just prior to the time I began to use borax, and is one of the reasons these two shipments were at least —or part of the reasons—or some of the reasons why I began using borax. Please remember that I am not trying to make this especially accurate in a chronological sense as it may have been 1907, 1908 or possibly the early part of 1909.

Dust on the fruit made no difference on the mail order business until people began the use of the washer. People [fol. 572] thought nothing about it because they knew nothing better. After washing became the custom it did make quite a difference in the open market as to price. In my mail order business I do not know that it made very much difference.

The machinery in the Emporia house which I occasionally ran the fruit through was sold about a year ago; that is, the machinery, house and lot—at auction.

It was sold at Emporia. The building is still there and some of the machinery is still there. I believe the sizer is there, and the engine, dryer and some of the shafting. I don't know where the soaking tank is, but that may be there. I think L. B. Douglas bought that. His postoffice address is Astor. Remember, I am not saying this positive, but I think he bought the washer.

Mr. McMichael is in the grave. Mr. Beers, Mr. Felt, Mr. Matison and Mr. Taylor are all dead.

J. L. Beers, son of John J. Beers, was the foreman of the house at the time I did my washing.

In some instances I paid 10 per package for the borax I got; some instances at a discount, probably about six packages for 50 cents. It is in my mind that I bought some in bulk, but I am not certain.

I suppose that Boraxine, one of the washing powders I had, had a lot of borax in it. I don't recollect. I understood

so at that time. It was made by the Larkin Soap Company, Buffalo, New York.

Some time in the summer a man came through our neighborhood and wanted to contract oranges—I believe that was his business—and somehow during our conversation I mentioned that I shipped fruit on mail orders, and as I recall it, he asked me if I ever had trouble from the decay of fruit and I explained that I used, or had used, borax. I don't know that there was anything further said on the subject but a few days later I heard that the Brogdex people were suing the [fol. 573] American Fruit Growers for infringement of patent. A few days later I received a letter from the production manager, I think he is now with the Florida Citrus Exchange—saying that he had understood that I had used borax for the purpose mentioned, and also saying that the Brogdex people had sued the American Fruit Growers and that possibly someone might come to interview me, which was the sum and substance of the letter—a very short letter. I don't remember the name of this production manager. I think his title is Production Manager of the Florida Citrus Exchange. I do not know that I have ever seen him but I believe I have met all of the other officers of the Exchange. I might add that was two years ago and of course they elect officers annually and not always the same ones.

There is no standard size of soaking tank. It is in accordance with the capacity of the house. Our house was supposed to be a capacity of one and a half or two cars a day, but we very seldom got that. There were two revolving rollers or brushes which gave us one runway. The tank had cleats to hold the partition. I just stood it up there and its own weight held it. That is, I stuck it across the tank, standing it up against the cleats. It was not absolutely watertight. So there was slight leakage through to the other side of the tank. I cannot tell you how much.

I will be sixty years old the 10th of January coming. I have lived in Emporia all this time—ever since I have been in Florida, I should say. My home place is five acres, and I have forty acres joining, undeveloped, and twenty acres partially developed, a half-mile north of my present home. I have 100 or 102 bearing trees. There are usually sixty-odd trees to the acre. I have two grapefruit and three or four tangerine, one mandarin.

[fol. 574] Redirect examination:

In my home packing I put one box—one picking crate—into the tub at a time.

(An ordinary washtub is introduced here and examined.)

My tub was no smaller than this. I think that is about the size (measuring). Twenty-four-inch top; ten and a half inches deep; twenty-one inches in diameter at the bottom. To start with I would fill it up with water to about there (pointing at tub). This is a guess remember. I presume just about there (pointing again).

(The tub was measured again by Mr. Palmer and showed three and a half inches from the bottom.)

Fred J. Burden

Fred J. Burden, of Emporia, Florida, a witness in behalf of the defendant, American Fruit Growers, Incorporated, having first been duly sworn, deposes and says in answer to interrogatories by Mr. Morton, as follows:

I have known George W. Palmer, who has just testified here, for six years coming about the 20th of this month. My place joins him on the south. My house is not more than fifty or seventy-five feet from his; just across the fence line. His house in the width of five acres and mine is on the northwest side of ten acres, facing both on the road.

Q. Have you ever had occasion to observe how Mr. Palmer packed his fruit?

A. Yes, sir. The first season when I bought the place I had no knowledge of citrus culture and wanted to learn all I possibly could. Mr. Palmer was packing fruit to be [fol. 575] shipped by mail order and I went over and visited him. I found him busy. He had, oh, three or four zinc or galvanized washtubs which I thought were filled with water. I asked, "George, are you scrubbing them up?" He said, "Yes, sir." I noticed on going nearer that the water seemed kind of milky. I said, "What have you got in there?" He said, "Borax." "Is that any good?" He said, "Yes," and that he had "used it for a number of

years." I asked, "What did it do, clean them?" He said, "Not only cleans them but preserves them. It keeps the fruit from decay."

I have shipped fruit myself. I shipped it through the Exchange. I had noticed Mr. Palmer on several occasions, not only that season but the seasons that followed between, except, I think it was last year, he didn't ship very much because, on account of his wife being sick all winter, he could not get out for picking so shipped all through the Exchange, or the biggest portion of it. Being of an inquisitive mind, I watched and went over and saw the fruit that he culled out before washing and the fruit that he culled out and left in the boxes after the washing.

Q. Did you notice any difference in the fruit?

A. Yes, sir. I noticed the difference in the fruit. The fruit that was culled before washing, some showed fine decay. The fruit washed and set in boxes after washing seemed to redden and color without decay and instead of going to decay, dried up.

I have sampled some of these culls that did not decay. I have gone over them and grabbed up an orange and taken it and eaten it. Of course the skin gets tough but retains the juice.

Depositions Taken November 2, 1926, at the Packing-house of the New Smyrna Packing Company, New Smyrna, Florida.

[fol. 576] WALTER A. ROBINSON

WALTER A. ROBINSON, of Oak Hill, a witness in behalf of the defendant, American Fruit Growers, Incorporated, having been first duly sworn, deposes and says in answer to interrogatories by Mr. Morton, as follows:

I am thirty-eight. I am manager of Oak Hill Citrus Growers. I have been connected with the citrus packing industry all my life, I guess you would say. Raised at it.

I know a Mr. F. S. Pond. In the beginning he was the manager of the Lake Region Packing Company at Tavares, Florida. I worked for him there. I did grading and general packing—just general house work. I was under him

two other seasons at Eustis—1912 and '13 and '13 and '14. Now let me see; am I right? Thirteen and '14 and '14 and '15 would be right. I was foreman. The house foreman has charge of all the operations taking place in the packing house.

We had a regular soaking tank to wash our fruit at the Eustis house. It was washed out daily and refilled. We used borax and washing powders in the water of the soaking tank at Eustis. We used both at the same time if we had them on hand. We tried to keep both on hand all the time. Mr. Pond told us to use borax and washing powder in the soaking tank. He seemed to think it was a preventative for decay. He told me that. I cannot remember whether we used it through the two seasons of 1913 and '14 or not. I know we used it for quite a long time anyway. I cannot recall how much borax was used. He told me how much to put in at the time and instructed me to use it, but I cannot recall what that was. It seems to me it came in half-barrel lots, but I am not positive. Well, probably left fruit in the soaking tank five to ten minutes—five to six minutes in order to go through. Then it went into the [fol. 577] washing machine, and from the washing machine into the dryer, and from the *dryer, dryer* to the polisher.

We had a Limoniera washer. It had disc plates that revolved and had side brushes on the side to steer it through. The brushes were flat brushes and revolved. Our polisher was a Parker polisher, the same as in use now. The water in the soaking was warm, heated by coils of pipe in the bottom of the tank by a steam boiler. We tried to keep it at a particular temperature. While I cannot remember just what that was, I remember it was distinctly warm to the hand.

I cannot remember what the particular brand of washing powder was that he liked to use, but I remember that it was one certain kind he did want used because it contained more borax than any other brand he could get. He used beside the washing powder, straight borax in addition; mixed them together in a pail. We used both at the same time.

In the polisher which we used we put paraffin on the oranges. We had a little box made that fit just underneath the brush and with a lag screw that fit just underneath the brush. Then the lag screw pressed the wax against the

brush. You just turned that a little and it would pull it up against the brush. That sort of polisher was in general use at that time.

I cannot recall, how many boxes were packed during the two seasons I was there, but it seems to me about sixty to seventy-five thousand each season. There was very little decay. I do not know for sure that Mr. Pond attributed the small decay to the borax treatment, but he left that impression with us, and I know he made the remark several times that we were getting by with less decay than other houses in the state.

We had city water at that house. Its source was a deep well. I would say it was soft, although I am not positive. [fol. 578] Mr. Pond was not at the Eustis house after the second season I have described. He took a position as state inspector for the Florida Citrus Exchange. He is dead now. I did not continue to work there at the Eustis house. I came here to this house at New Smyrna.

We moved to Oak Hill in 1922. I have not used borax subsequent to the two seasons I was under Mr. Pond. Mr. Pond was manager at the Eustis House. I was foreman.

Cross-examination:

The fruit was brought to the Limoniera washer from the soaking tank by means of a roller conveyor or elevator. The washer took off all the dirty stuff and everything of that kind that came from the tank. The washing powder was put in there. At that time we had a lot of white fly. We let it soak a few minutes and when it got on the brushes it removed the dirt and scale. After I came over to this house at New Smyrna, where we are taking this testimony, I used no borax in the water. I used blue stone because at that time, the state authorities were recommending the blue stone for the purpose of dipping field crates to prevent taking the disease from one grove to another. I figured it was a good preventive for decay.

Since leaving this house at New Smyrna we haven't used anything. We have a sprinkler system and no tank. We adopted no other expedient for reducing decay in our present practice except pre-cooling. We have installed a cooling plan. We have a pre-cooling plan and paraffin. We also use paraffin in our polisher.

It was Mr. Pond's practice, and my practice also, in handling fruit through the packing house to take pains to see that it did not get scratched or bruised. Mr. Pond was [fol. 579] an old maid about that—very fussy. He had a reputation for being that.

I came here for the first two seasons as foreman. I was here from 1915 to 1922. I was foreman at first and the last under Mr. Bledsoe. And the next year I went back to Winter Park to work for Mr. Pond again. We did not use borax at Winter Park either. We used the washing powder again. At least I cannot recall using borax again. At the time I was manager of the house here at New Smyrna it was a member of the Florida Citrus Exchange and one of the houses—group of houses called Indian River Citrus Sub-Exchange.

When the fruit was in the soaking tank it was treated with washing powder there. It was just scrubbed in the washer itself with a little plain water sprinkled on top that rinsed it off. I cannot tell you the dimensions of the soaking tank in that installation at Eustis. I would say it was probably about twelve or fourteen feet long, two and a half feet in height, and six feet in width. That's approximately. I did not personally add the washing powder to the tank. A man who looked after the washing machine did that. A fellow by the name of Boone. W. A. Boone. Our house at Oak Hill was also a member of the Florida Citrus Exchange and a member of the Indian River Citrus Sub-Exchange.

As I remember it we didn't have any excessive decay here at New Smyrna. But occasionally we had some of it. We have that most any place. We have not had any serious decay at Oak Hill. We had some before installing the pre-cooling plant which has reduced it considerably since.

I do not recall whether or not Mr. Pond was very talkative about this matter of using borax. He did not say much to me about it. I rather think he might be the type of man likely to talk much about it. But he didn't say much to me about it.

[fol. 580] I had less decay when using bluestone than they had at some of the other houses in the Sub-Exchange. I don't remember whether it did as much good as the washing powder and borax. I used the washing powder with the bluestone, but did not use the borax.

Re-direct examination:

I guess this polisher which is here now in the New Smyrna house is the same one which was here when I was foreman. I did not notice, I could tell it if I saw it I guess. (He looks at it). It is the same one—the one here while I was here—except that they are using springs to get their tension on the paraffin instead of bolts. That's about the only difference in it.

Recross examination:

These springs are to push the paraffin up against the brushes.

KIRBY LOWD CHILTON

KIRBY LOWD CHILTON, of New Smyrna, a witness in behalf of the defendant, American Fruit Growers Incorporated, having first been duly sworn, deposes and says; in answer to interrogatories by Mr. Morton, as follows:

My father's name was Benjamin F. Chilton. He is now dead. I think he died in August, 1910, as I recall it. At the time of his death he was manager of the W. E. Connor "Ronnoe Groves" Estate at New Smyrna. At that time I lived here in New Smyrna. We did not have house numbers in those days but right next to the Estate, corner of Faulkner and Ronnoe Lane. I was twenty-one when my [fol. 581] father died. I was working at that time. I was stenographer and just shipping clerk, and general roustabout you might say, wherever they found a job for me, but in my father's office the most of the time. You know how it is in the orange business, in the summer time there is not much for the office crews to do so we went out where we could be of use.

I can't tell you the name of the machinery they had in the packing house in the grove but they got the best they could get everywhere at that time. Connor was running an experimental place and used the best he could get. He used some Warner and some Maull machinery. I recall the construction of the washer he had at that time. There was a cylinder that turned inside of a vat of water and on each end of the cylinder there was a gear shrunk around

the end of it on the outside; then there was a set of spur gears that set into that on the bottom and a shaft run through with a pulley on the outside with a packing nut to keep the water from running out at that one point so it left the inside of the cylinder free without any axle or anything inside of it. Inside of that cylinder was a spiral arrangement made out of corn sacking and a rubber formation and when it revolved the spiral sent the oranges through. We also put loose sponges in there with it to help clean the fruit.

At each end of the washer was a space about two feet, one end where they dumped and poured the oranges in, and on the other end about the same space, where they took the oranges out. They had a splash board in so they could put as many in, or stop them up, as they wanted to. It was a kind of sliding gate that went down in there and they poured in the number of boxes they wanted and let them go through. And on the opposite end, at that time, they just simply had the dry rack, almost level with the top of the water and just lifted them out most of the time. We [fol. 582] had a little kind of board and lifted them out and let them run down onto the drying rack.

The washer and drying rack were outside of the house. The dry rack led in to a window in the house.

The rest of the operation was performed in the house. The grader took it from there and handled it. They had the old-fashioned tilting bins.

Q. What sort of water did you have on the place?

A. We used all the time, as much as we could, rain water, got in a tank beside the packing house, from the eaves.

Q. Do you recall whether anything was used in the washer besides plain water?

A. For years we never used anything, but up about 1905, the year when the white fly commenced to appear, we used washing powder, and about the same time we used borax. The washing powder we used according to conditions, or how dirty the fruit was. The borax we used to harden the fruit so it would ship better.

Q. Was your father the active manager of the place?

A. He had been for twenty-seven years, up to when he died.

Q. Did he ever say anything to you about the purpose of the borax, that you recall?

A. After he came back from California I used to be with him all the time. He said he had something that was going to put the fruit on the market as good as the California fruit. We had quite a little trouble with rot. In each shipment of about twenty or twenty-five boxes we put in one box for a filler. That was a box of fruit of ordinary size, and when the oranges got to New York and if any was decayed we had them repacked, first through J. Pratt Carroll and later on through our own office. They established a receiving end there later on.

[fol. 583] Q. Did your father tell you what this idea was he brought back from California?

A. He told me it was borax, and said he was going to use it that winter.

Q. About when was that, as near as you recollect?

A. That is one thing I could not say definitely. It was about 1905. We figured using it the winter of 1906. I don't remember just when he did get home.

Q. Do you know whether or not he continued to use it as long as he lived there?

A. As long as he had anything to do with the place he used borax.

Q. Do you remember whether you got any better results with the fruit after borax was used, as to decay?

A. At first when shipping through Carroll it did not prove very satisfactory as we could not tell how things were going. Later we opened a new office with E. E. Aymar in charge, and then Mr. Aymar's report was that we need not send as many fillers as we had been sending because it was not necessary.

Q. Have you any recollection about the quantity of borax that was used?

A. Definitely I could not tell you. The first thing, when starting, we did not use much of it but later on they used considerable, but what it was I do not know. The only reason I know they used more is helping line the tanks. These tanks—the scale on them was formed from using borax because those tanks were very small and you had to crawl inside to reline them. I helped a man from Palatka to reline them. This scale got in his eyes and he asked me what it was. I said I did not know. Father came in then, and I said it looked kind of like white wash. He said it was borax.

In 1907 and 1908 I was away to school so I don't know what they did those two winters. I worked in the summer but left in October, to June, so do not know. The other [fol. 584] two winters, before my father died, I was in the grove, and thereafter.

I cannot tell exactly how much fruit we shipped a year, but except in 1909 we actually shipped thirty thousand boxes according to our records. I looked the records up about a year ago and I came across old papers, and we shipped thirty thousand, possibly the local stuff of two or three hundred more. We did a private customer business and delivered oranges to New York and Brooklyn direct, but from the packing house in Glencoe—that was called the "Jungle Grove", that was all consignment shipments. The grove where I worked was called the "Home Grove". In shipping that fruit we got the New York directory and it was a part of my work to get all these addresses and mail them a circular to deliver fruit in New York and Brooklyn for $3.50 for oranges and $4.00 for grapefruit. There was special care taken of the fruit from the shipment of the Home Grove so it would get to the market in good condition, that is why they were handled directly under father's supervision and not from the Jungle packing house. We made a mail order shipping list who they were to go to and each box was numbered and the customers name was numbered and this mailing list was sent in duplicate to J. P. Carroll and he looked at the number and sent that number to the house. It was not supposed to be repacked or nothing but just came directly from the grove.

After we got our own office we handled it practically the same way except that we had tags printed with our brand the Indian Head and had a place left on the tag for the name and address and they were packed over in the New York office and delivered from there. The New York office inspected the fruit and replaced any that was rotten. The same as J. P. Carroll did before we changed from him. [fol. 585] That spiral lining in the washer wore out and had to be repaired—just like anything of that kind will, like burlap lining, with oranges coming through it gets rough so the light band it was fastened to would get bare and it would cut the fruit up if it wasn't remedied. One man would get inside and one outside. It was riveted and

you had to get in to fix the rivets. It is hard to say exactly how big the drum was. As I remember, the drum was about twenty-four inches in diameter and about ten feet long.

Cross Examination:

There were three groves; the Jungle, Home and Osceola Groves. The Osceola was the young grove; the Home Grove was the old grove. There were two houses. The Home Grove packing house was in the middle of the third block. They had the groves in blocks. It was between Faulkner Street and Orange Street and half way between Ronnoc Lane and Wayne Avenue. That is the Home Grove packing house. The Jungle Grove house was located in Glencoe about the Northwest end of the grove, as near as I could tell without a map. If I had one I could place it exactly. The Jungle Grove was about three miles from the Home Grove house. The houses equipped and operated in practically the same manner. The Jungle Grove house was a little bit larger but operated the same kind of machinery that the Home Grove had and operated in the same manner. I don't know whether the washer I described was the same as the Warner washer.

Those houses are not still operating. Both of them are torn down. They have been abandoned. Property cut up and real estate got it sometime ago. I can't tell when those houses were abandoned as I was away from there and do not know. I cannot say when it was, but right around 1914 I imagine. I would not swear it was, but think so.

[fol. 586] The washer cylinder was set in a tank of some kind. There was very little space between the cylinder and the sides of the tank—just enough to—so oranges would not get under it. There is a certain whip to those tanks. To the best of my recollection there was a space of about two feet between the ends of the cylinder and the end of the tank. This cylinder was filled about two-thirds with water and floated up about level to the top of that end. They had a crude way of doing things then and men just lifted them out on an incline and they rolled on into the tilting bins. They roll out on the outside of the packing house. A man stood there and picked them out with his

hands. Sometimes he just used a board that was padded and sometimes just took the hands and sloshed them over the side. Then the oranges had to float to the upper edge of the tank, but one end was cut down and they floated just level with the water in the tank. Between the floor or bottom of the tank and the rotary cylinder was just about room to clear your hand under the cogs. The cogs were held by a thin band. The gear was shrunk around the ends of the cylinder like this—(A picture was drawn here.)—and then there were two small gears down near the bottom on each side, working on a bearing into the cylinder set on the end. The cylinder was made of galvanized iron.

After those Ronnoc Groves houses were abandoned the fruit from the groves was packed and shipped through the Florida Citrus Exchange, but I can't say that for certain as I was away. This house at New Smyrna was, at that time, a Florida Citrus Exchange house. About that time they built this building here, but I can't say what they done then because I don't know.

The washing powder and hardening agent I mentioned was put into the tank by what we called a "wash crew." They had a bunch of men who tended to the dumping of the [fol. 587] fruit and getting it in the house. They run the engine and tended to that end of it. They put the stuff in there under the direction of my father. I do not know how much they used. I cannot tell you what particular means was used to get it in the tank, but they had cans, as they will around places like that. I cannot tell you who this washing crew were because they were changing from time to time. At the Jungle Grove Manning had complete charge of the packing usually and he would know who the crew was, but the Home Grove, I do not know. I know all of the men around the grove but do not know any particular ones that were working at that time. Old Gus Taylor worked there some, and Harry Walker and Jonas Meeks and Oscar Anderson and a fellow named Grant, and Mose Person. They were mostly negroes except the engineer—a fellow named Captain R. J. McCarthy had charge of that house for a while. He was the only white man who was in charge when I left. But they did not have anybody at the head of anything out there but they told a certain one at a certain day to look after it. Gus Taylor was one of them

and had as much responsibility as anyone. Gus and Oscar, they were the old-time negroes and as they say "had the seniority" because they was the oldest onest there. They were looking for soft jobs so had most of them.

I run a marine railway and boat yard at present. I have been working at that for four years. I was born in 1889.

Our fruit at Ronnoc Groves was the prettiest fruit in the State until the white fly got in here and then it was like everybody else's and was black. It was pretty hard to scrape that smut off.

My father insisted upon the fruit being carefully handled. He was more particular about that than anything else around the whole plantation. We had to wear gloves. He had women pickers and women graders. All those work- [fol. 588] ing wore gloves. Pretty nearly all wore gloves. At the wash tank their hands were wet. Sometimes they used padded boards and just simply sloshed them out and they did not hardly handle the fruit at all. They culled the fruit very closely. They took little wooden paddles to scrape spots off. They took care not to ship any fruit which had any scratches at all. He was very particular about picking in the grove too. They had heavy padded baskets at that time and did not use the picking sacks they use today.

There is no Ronnoc Groves any more. About one year after the packing houses were abandoned the groves were abandoned. I was stenographer and shipping clerk—I don't know what you would really call it. I did some book-keeping in the meantime. The only thing I had to do with purchasing was that I wrote the letters. I can't remember definitely from what firms we purchased our washing pow-ders, hardener, etc. That is something I don't know. I have tried to think but really don't know. If I said what I thought, it might be wrong. It is pretty hard to remember details like that after a long time being out of that business.

Jonas Meeks

Jonas Meeks, a witness in behalf of the defendant, American Fruit Growers Incorporated, having been first duly sworn, deposes and says in answer to interrogatories by Mr. Morton, as follows:

I was born in 1877, August 12th, making me about forty-nine years old and ready to step out. I knew Mr. B. F. Chilton. He is dead. I don't know exactly how long he's been dead. About fourteen years. I worked for him between sixteen and seventeen years. His business was Orange Grove business, Ronnoc Grove. He had charge of the [fol. 589] grove. Mr. Washington E. Connor was supposed to be the owner of the grove. He was the owner of the grove at the time.

I was a butler. I was butler but worked every here they put me. Sometimes I was in the orange grove, carrying mail, in the garden—an all-round man. I saw them packing oranges on the place. I was sometimes in the house toting boxes and sometimes hauling them. I remember they had some apparatus for washing the oranges. They had one of these rollers made into a box. This roller was in the box and if run with a little gasoline engine, and they fed the oranges in one end of the box with a sponge and they rolled through the boxes, and they picked the oranges out and put them in the dry bin on the side of the house, where they dried the oranges on the outside. They had water in the box around this roller. So much water in the box (indicating).

Q. Do you know whether or not they used anything in the box?

A. Mr. Chilton used some borax, one thing, he used.

Q. Did he use anything else?

A. Oh, he used several different things. He used washing powder in there. When the oranges was dirty he used some of that.

Q. How do you know it was borax?

A. Well, he said so.

Q. Did he tell you what he used it for?

A. Well, he did tell me what he used it for, but it has been so long I can't tell.

Q. Well, what is your best recollection of the matter?

A. I don't know no recollection. I want to tell just what I know about the thing. I don't want no recollection here. I know he said it was borax. That's all I am positive he said about it.

[fol. 590] I don't know how long he used the borax. I did some of the hauling on the place. I don't remember

hauling any borax. I never fool with anything like that—I didn't go up to the station. I did my hauling in the grove. Gus Taylor ran the washer. I don't knew whether Gus Taylor was working there when Mr. Chilton died. I was still working there when he died.

Cross-examination:

I worked at this packing house—Ronnoc Grove Packing House. That was the only name I know of. My regular work was up there, but I did work in the grove. That's the name—Ronnoc Grove. And this packing house was right here in New Smyrna—just on the edge of New Smyrna.

I never heard of that borax spoken of as a hardener. Mr. Chilton just said it was borax. I asked him then, and he said "just borax." I never put any in the tank myself. I didn't bother with it at all. I never saw anybody else put it in.

I am now working for Mr. T. L. Howell, of the Bond-Howell Lumber Company. I am butler. Mr. Walter Chilton asked me to come and testify here. I don't know exactly when anybody first began talking to me about testifying here. First time I heard of the thing was about two or three weeks ago—probably might have been longer. It wasn't six months ago. It was just a little while ago. I don't know what Mr. Kirby Chilton did around the packing house when I was there. I saw him there, but I don't remember what he did. I don't know what he did around there. That wasn't my job.

Redirect examination:

Gus Taylor, Oscar Anderson, Bill Codlidge, Arthur McCorkle, and lots of men that I didn't know, worked at the place—lots of them, but I didn't know their names. Oscar [fol. 591] Anderson was one of the grading men—one of the graders in the packing house. Mr. McCorkle and Mr. Codlidge were white men. They were packers. Oscar Anderson was a black man.

GUS TAYLOR

GUS TAYLOR, a witness in behalf of the defendant, American Fruit Growers, Incorporated, having been first duly

sworn, deposes and says in answer to interrogatories by Mr. Morton, as follows:

I am fifty-seven. I knew Mr. B. F. Chilton. He is not living now. I don't remember when he died—the years—that 'scaped me, the number of years. Oh, about 1910, somewheres around there. I don't know for sure. I worked for him. He was in the orange grove business when I worked for him. Ronnoc Grove, that was located north end of town here. North end of New Smyrna. One part was, and the other part was out west. Mr. Chilton's fruit was packed on the place. He had two packing houses.

I run the washer in this house in town and see after the gathering of the fruit. I don't know the name of the washer, but I can come pretty near telling the size of it, but it slipped my memory about the name. The size of it was ten feet long. Round three and a half feet deep. About three feet wide. It was built just like that—right straight square across. That washer was built just like this table—just three and a half feet high and about three feet wide. The tank was in the washer. The tank was made out of galvanized or sheet iron—the tank was. It was round. The oranges went through it, of course. It rolled. I don't know whether it had anything on the inside or not. I don't remember anything more than what I put in—that was the sponges. I put sponges in it with the fruit. Oh, I put in [fol. 592] three to four or five boxes of fruit to start with. Then I would add more as they came out. The oranges went through the galvanized part and came out the other end. I took them out with my hands. Then they went on the dry rack. From the dry rack then went inside the house.

Q. Did you use anything in the washer beside plain water?

A. Yes, sir.

Q. What else did you use?

A. I used borax and washing powder.

Q. Who told you to use the borax?

A. Mr. Chilton. Had orders from him to do it.

Q. How many years before Mr. Chilton died did you start working for him?

A. Oh, quite a few years. I don't remember just how many now, but I know it was quite a few years—quite a few.

Q. Were you using borax and washing powder at the time Mr. Chilton died?

A. Up until he died—well, not up until he died. When he died it wasn't orange season.

Q. You used it the last orange season before he died?

A. I did.

Q. And for how many years before that, would you say?

A. That I was using borax? Oh, about six or seven years.

Q. Did Mr. Chilton tell you what he was using borax for?

A. He did.

Q. What did he tell you?

A. That blue mold, and make the oranges carry better.

Q. Well, do you know whether the use of the borax did make the oranges carry better?

[fol. 593] A. I do, sir.

Q. How do you know that?

A. Because I tried it. I tried one with borax and one without borax.

Q. One what?

A. One lot of oranges—one lot of fruit.

Q. About how much fruit was in the lot, do you remember?

A. Oh, in the neighborhood of fifty boxes—half a carload, or something like that.

Q. About fifty boxes with the borax and fifty boxes without the borax, is that what you mean?

A. Yes, that's what I mean.

Q. What was done with that fruit?

A. Well, when that fruit was shipped we got returns. One was bad without the borax.

By Mr. Steward: Objected to as secondary.

Q. Under whose instructions was this shipment made?

A. By Mr. Chilton.

Q. Do you know whether you ever made any other tests to see if the borax was preserving the fruit?

A. No, that was all he gave me.

Some of the fruit was shipped to the customer and some of it to the commission merchant. I don't know whether any provision was made to replace the spoiled fruit. He didn't tell me that. He got the returns. We had a practice of shipping extra fruit. I don't remember who the fruit was shipped to.

Q. Who put the borax and washing powder into the water in the washer?

A. I did.

Q. Do you remember how much borax you used?

A. I do, sir.

Q. How much was it?

A. When the oranges was real dirty I used thirty pounds.

Q. And if they were not very dirty, how much did you use?

A. Less. I reduced it down.

[fol. 594] Q. About how much water did you have in your tank?

A. Oh, I would have about three barrels.

Q. Well, how much washing powder did you use?

A. I used one and one-half when it was real dirty. When they wasn't real dirty I used one.

Q. One what?

A. One package of washing powder.

I worked for Mr. Chilton all the year round. Besides tending the washer I tended the grove, and took care of the stock, cows, and horses. Mr. Chilton never said anything to me about where he got the idea of using borax.

Q. Do you remember where Mr. Chilton bought the borax you used?

A. I say I do not remember just where he got it.

Q. Do you remember about how much he got at a time?

A. About three wagons full—three wagons full.

Q. What did it come in?

A. Came in these half barrels.

Q. Did you make up a fresh solution every day in your tank?

A. No, not unless I changed my water.

Q. Every time you changed your water, did you put in fresh borax?

A. Some days I changed it twice or three times; some days not at all when it wasn't so dirty. Of course I changed it every night when I got through with that day's work.

Q. You started with a fresh solution every morning?

A. Yes, sir.

Q. Do you remember whether or not the borax showed on the washer any?

[fol. 595] A. It did.

Q. How did it look?

A. Looked whitish, as if you sprinkled powder or something—just whitish.

Q. Did you ever notice any on the fruit?
A. No.

I continued to work at the Ronnoc Groves after Mr. Chilton died—something like two years—something like that.

A gentleman by the name of Krooms—Mr. Krooms succeeded Mr. Chilton as manager. He is a Swede. I couldn't spell his name. He did not go ahead with Mr. Chilton's methods. He changed it. The grove didn't keep up as well after he came there as when Mr. Chilton was running it. That's the reason I quit him.

I liked Mr. Chilton's methods better. That was the right way. Mr. Chilton was very particular about how everything was done. He really was. If you scratched a tree or the oranges or anything with the horses going through—he would sure get with you.

I have known something like to ship three thousand boxes—or two—in a year, the difference according to the crop—three thousand or something like that.

There were two packing houses on the grove. The firm owned two packing houses. There's one at the Jungle and one here at home. I worked at the one right here at home. This was the Ronnoc Grove and that was the Jungle Grove. They belonged to the same man, Mr. Connor.

I never worked at the Jungle Grove, no more than to go out there to carry boxes sometimes with the wagon. Mr. Shady Mannings was in charge there.

Cross-examination:

I had on gloves, that's how I could help scratching the fruit when I was putting it through the washer in the tank. Everybody wore gloves. He didn't ship any oranges that [fol. 596] got scraped or damaged at all. He wouldn't do it. When the fruit wasn't dirty we used quite a little less of the stuff—according to the dirt that was on it and shape it was in.

About three weeks ago somebody came to me asking me to tell this use of borax. Nobody had asked me before about it for ten years or more. They didn't tell me to remember anything about remembering about borax. They just wanted to know if I used it.

I had a measurement to put it into the tank. Of course I poured it into the water. He weighed the first lot for me,

I had something like a kettle with tin rings in it to put it in with. It was similar to a cooking kettle, but it was of wood, you know. I never tried it in a tin or an iron kettle. I just used the same measure he gave me. I just used it until I quit. It stood about so high (indicating with his hands a certain distance above the table. The distance was measured by Mr. Steward and the measurement showed thirteen inches).

I know what bluestone is. They used a lot of it in the grove but not in the house. Ground bluestone is blue. Sure. Oh, yes, it is blue.

I never heard them talk about any stuff there that they called a hardener. If I did it has slipped my mind. I am sure I never told anybody lately that they did call it that. This roller part that the oranges went through was ten feet long.

Q. And how far was it from the end of that roller part to the end of the tank where you put the oranges in?

A. About like that, sir.

(Here the distance was indicated by the witness.)

By Mr. Steward: Hold your hands, Gus, don't move them. [fol. 597] Witness: I won't move them. You needn't fear about my moving them.

By Mr. Steward: Two feet.

It was just about the same distance from the other end of of that roller to the place at the end of the tank where I took the oranges out. I didn't measure how high the water came because we had a ring on it where Mr. Chilton marked it. About ten inches I would say. Mr. Chilton put marks on the wooden kettle so as to tell how high to fill it.

Mr. Harper asked me to testify here. I think he rings to tell you how high to fill it.

Mr. Harper asked me to testify here. I think he works right here. I don't think it—I know he works here—here in this packing house where we are now. I don't know why I am testifying here. I don't know what it's all about. No, not a thing. Nobody told me that some western company was trying to make the people in Florida pay for treating their fruit with borax. Didn't anybody tell me—I just heard it. I just heard it without being told. Mr. Harper was not the only one who came to me and asked me to testify.

There was two other gentlemen came to see me one night when I was fixing to have supper. They didn't ask me to testify here. Those gentlemen are here today. (The witness here points to Mr. E. M. Brogden and Mr. C. F. Flake.) They just asked me had I ever used borax, and I told them. They talked quite a few minutes.

Q. When they were there did you go back into your kitchen or somewhere at least in the back of the house and get a kettle and bring back to show them about the size of the kettle or whatever you used to put this stuff in the tank?

A. I showed them the size of the kettle all right, but told them it was larger and taller.

Q. Isn't that about the size of the kettle?

[fol. 598] (Here an enamel kettle or stew pan was exhibited.)

A. No, sir, mine was really larger than that one.

Q. You will swear this was so?

A. I know it was so.

Mr. Steward: The kettle which I have just exhibited is seven inches across the bottom; seven and one-half across the top and four and a half inches high. It is an iron enameled stew pan with two handles.

Q. Now, Gus, as a matter of fact, didn't you tell these two gentlemen, Mr. Brogden and Mr. Flake, that you filled the tank up to about two or two and a half feet with water?

A. I told them I put in three barrels of water.

Q. Didn't you tell them that you filled the tank up to about two to two and a half feet with water?

A. I don't remember that. They asked me how much water, and I told them three barrels.

Q. Will you swear that you didn't tell them that?

A. I will, sir. Not in my memory—no, sir—I don't remember telling them. I remember about the borax six or seven years ago. I must remember about the three barrels of water.

Q. I am asking whether or not you told these men the other night that you filled that tank between two and two and a half feet deep with water?

A. I told them I put three barrels in it.

Q. Never mind about your memory.

A. No, sir, I didn't tell them that. If I had told them that I filled it within three inches of the top I would have remembered.

Q. Who said anything about filling the tank within three inches of the top?

A. Who said anything? I don't know nothing about it.

[fol. 599] Q. Well, just a minute ago, Gus, you said something about that if you had told them that you filled the tank within three inches of the top you would remember telling them that.

A. Yes, I would remember.

Q. Well, I didn't say anything before that about within three inches of the top. I guess that was in your mind, Gus. I didn't say anything about that. Now, what do you mean by within three inches of the top?

A. You mean if the tank stook up like this (indicating) and the wooden part—and you put water in it, it would be three inches from the top?

Q. I am not saying anything about it, Gus. I am asking you what you mean. You were the one who said it first. What were you talking about?

A. What, you speaking to me? Didn't you ask me just a minute ago—"didn't I tell those gentlemen that was there the other night that I filled the tank within three inches of the top of water?" You asked me, didn't I tell them that?

Q. No, I didn't ask that. Now, what do you mean by within three inches of the top?

A. You said that. I ain't got no more to say about it.

Q. Then you won't tell me what you mean by within three inches from the top; is that right?

A. I done told you what you asked me.

Q. You are not going to tell me, then what you mean by three inches of the top, do I understand you right now, Gus?

A. I told you what I told you—what you asked me.

Q. Gus, I asked you if you didn't tell those gentlemen the other night that you filled the tank with water from two to two and a half feet deep. I didn't say anything about three inches from the top. You put that in yourself afterwards. [fol. 600] Now I am asking you what you are talking about when you say three inches from the top?

A. You just heard me tell you that I put in three barrels of water and that's what I had instructions from Mr. Chilton

to use, and if I put in oranges enough to swell that too high I let some of it out.

Before I put the fruit in, the water level would be up to the mark, and then pouring in my fruit would swell the water, and if it got too high I would let some of it out to keep the oranges from bumping. After I put the fruit in the level of the water was pretty near the top of the tank. Oh, something like four or five inches to the top of the wooden structure. Yes—four or five inches. There was a cylinder in the washer that was made of zinc. I didn't notice how thick the walls of it were. The oranges went through that cylinder. I didn't measure how high from the bottom of the wooden tank or vat that cylinder was. It was just high enough for me to clean off the dirt—the dirt that comes off the oranges—when it got stuck in there. I never heard that stuff I put in the tank called a hardener. I heard it called borax—that's what I used. I heard them say it was something to make the fruit carry better so it would ship better. I never heard them say it was to harden the orange. I never heard them say that word. I didn't tell these gentlemen the other night that it was to make them hard. I told them just what I told you. Just make them ship and carry better. I didn't use that word "harden" or hard.

The washer tank—three and one-half by three. Three and a half feet deep. Three feet wide. I said the washer—the wooden structure was ten feet long; the roller was inside of that. I didn't tell Mr. Brogden or Mr. Flake the other night that this wooden structure was four feet wide and three feet deep. I told them between three and four feet wide. Yes, I told them that. I said it was between three and four feet.

[fol. 601] I suppose Mr. Chilton had a lot of confidence in me. I suppose he trusted me a good deal. I suppose he didn't tell everybody about using this borax. I don't remember him telling anybody, sir.

Redirect examination:

Mr. Chilton never told me not to tell anybody about the borax.

The kettle just held thirty pounds. The wooden part of the washer did not set flat on the floor. I had blocks on each

end. When I said it was three and a half feet deep I meant just the washer. Just the washer outside was three and a half feet deep. That would not be counting from the blocks. It would be setting on the blocks. The outside of the wood was three and a half feet. The wood that the bottom was made of was about 3 inches thick. The middle was higher than the top. The metal was below the wood. After I got the oranges in the water, the water was above the top of the drum. The whirl of the water made the oranges go into the roller. They couldn't go through the other way. They had to go through the drum. There wasn't room on each side, between the drum and the side of the tank. The whole drum, the whole cylinder or roller would be below the surface when I got it full of oranges.

Recross-examination:

Mr. Chilton was a member of the Horticultural Society. He used to go to the meetings while he had his health. I didn't go but he used to tell us when he was going.

[fol. 602] Depositions of Gamaliel Wyatt Holmes, H. H. Allen, Minos E. Miller, J. C. Thompson, Albert E. Barnes, and Shadrach D. Manning, taken at the office of American Fruit Growers, Incorporated, Orlando, Florida, on behalf of the defendant in the above-entitled cause, beginning on December 10, 1926, and concluded on December 11, 1926, in the presence of E. M. Brogden, of Complainant, and R. F. Steward, Esq., 700 Tenth Street N. W., Washington, D. C., and M. C. Massie, Esq., New York, N. Y., of counsel for complainant; and W. B. Morton, Esq., 165 Broadway, New York, N. Y., of counsel for Defendant.

GAMALIEL WYATT HOLMES

GAMALIEL WYATT HOLMES, of DeLand, Florida, a witness in behalf of the defendant, American Fruit Growers, Incorporated, having first been duly sworn, testified as follows:

Direct examination:

I formerly lived in Eustis. I am a gentleman of leisure. When I lived in Eustis I was in the banking business. I was

president of the Citizens Bank. I was also president of what we called then the Exchange packing house of the Eustis Citrus Fruit Growers Association. The house was connected with the Florida Citrus Exchange.

I have been connected with the association since the Citrus Exchange organization; and a gentleman came over with me this morning asked me that, and I told him that I had been through such serious illness that my mind was not fresh. It is my recollection that I was president of the association along about 1912 or '13.

A man by the name of Pond, who is now dead, was in charge of the packing house at that time. And Robinson [fol. 603] had charge of the packing of fruit. I do not remember about when Mr. Pond died. I know about when it was, but I don't remember positively. I have been through a very long spell of serious illness, and I haven't got those things stamped on my mind. Yes, it was quite a number of years ago; it was while Walter Robinson was there.

Mr. Pond was there about '12 and '13. That is my recollection. He was the first manager that the house had. Mr. Pond's initials were F. S., I think. F. S. or S. F., I have forgotten which.

I went down to the packing house myself every day or two; sometimes oftener than that.

Q. Do you recall the procedure that was used in packing the fruit?

Mr. Steward: Objected to as leading, and including an assumption that has not been established yet.

Mr. Morton: Just go ahead.

A. (Continuing:) Well, I—what do you want to know in reference to the——

Q. Just the procedure as you recall it from the time that the fruit comes in the house and goes through; whatever procedure it goes through.

A man just brought his fruit there, and he was given credit for it, and it was packed; and then he was given the bill to show that he had that much fruit. Sometimes it was washed, and sometimes it wasn't. Some didn't want to pay for the washing, and it was omitted.

They have a machine; it is just poured in the hopper, that conveyors go around in; a lot of water flowed on it;

that is, they had their machines, you know, to make a spray that came down on it; and then out into a hopper. Well it went through a long conveyor that dried it; and then it went into a hopper, and was put into another hopper [fol. 604] and carried down to the conveyors where the packers were, and was packed. I recall that some material was used in the washing tank besides plain water.

They had some kind of a powder; I don't know what the powder consisted of, but I know that it was in packages, and it made a very lasting impression upon me, because at the time when it arrived, I don't know why it arrived so early, the packing house was not open, and they brought it up to the bank; I suppose it was brought there because they knew I was president of the company, and they carried it back and put it in a little hallway that led from the entering room to the banking room, back to the directors' room, and toilets; a little narrow passageway not more than six feet wide, I suppose, and it got to be a regular nuisance, and I raised a kick about it, and asked what it was; and they said Mr. Pond their man had it, and didn't know where to put it, and he asked permission to put it in there; and the cashier of the bank told him all right, to put it in there; and from some cause or other, I don't know what, it was finally taken out of the barrel, and just stacked alongside of the baseboard; and it got to be a regular nuisance, people coming in and going from the light room into the darker room ran into it, kicked it over, and scattered it all around over the floor; and we had a director's meeting later on; and several of the directors stumbled over the stuff, and Mr. McCormick I remember was one of the directors, cussed a blue streak, and said he thought it ought to be taken out of there; so I ordered him to take it out. It stayed there for two or three months, though.

I do not remember what the material was. I know what they said it was; what Pond said it was for. I saw them using it in the packing house, and I supposed they were using it for washing citrus.

[fol. 605] Q. What did Mr. Pond say it was used for?

Mr. Steward: Objected to as calling for hearsay.

Q. Go right ahead. Go ahead with your answer.

He said it was to stop blue mold rot. That is what they used it for. I have seen it at times put in the tank

Q. How did the fruit packed by Mr. Pond compare with regards to decay with other fruit in the vicinity?

Mr. Steward: Objected to. No proper foundation having been laid for such a question.

It was—I know there was a good deal of controversy between the growers as to the efficiency of it, and it was thrashed out in a directors' meeting one day, and it was proven that where they used it, the percentage of decay was practically eliminated, and where it was not, why the fruit [illegible] other customers' fruit would go to almost total [illegible] on account of blue stem rot; it was very bad this [illegible] all over the State. The rot is worse some years than others. I don't know what causes it; I am not an expert orange grower. Some say it was one thing and some another. I know that I have seen trees, I have seen 90 per cent. of the oranges hanging on them that would be pear shaped; you see when they get it they just hang there; and other years I have seen it where it was not so serious, yet they used it because they seen that when they took fruit without using this washing solution that it would not carry in shipping. That was the years when the decay was bad.

Mr. Pond stayed at the Eustis packing house two years; that is my recollection now. I won't be positive about it, however. My health has been so bad, and I have gone through so much that my memory is somewhat treacherous; I know that he was there two years, though. I am sixty-four years old.

I think Mr. Pond continued to use this powder during the entire period of his stay at Eustis. I could not say [fol. 606] positive about it, but I am under that impression that he did. I don't recall what the material was, although he spoke of it as a washing borax. I don't know where Mr. Pond went when he left the Eustis house. In fact he never lived long afterwards.

Cross-examination:

The oranges were not sprayed before they went to the dryer; they were washed. They had a tank, a big square tank, and this water with the borax of course put in there, put in the water, and they had a carrier. When they were thrown up on a table that carried them down and dumped

them into this tank; and then they had another tank, after that they had a thing that stirred them, that run by machinery, kinder paddle or flange-looking concern that kept them moving around slowly; and after they had stayed in there a certain length of time, why then they were put on another carrier with brushes in it, and rubber matting, and carried on down and put into what they called the dumping bin, a place where they did the packing.

You see, they had been in this tank and had gotten wet, and didn't need anything after getting thoroughly wet. It will take an orange some time to dry naturally.

I do not know the name of that brushing machine. I had never seen one before that. It kinder revolved, it would keep the fruit moving, you see; I think nearly all of the packing houses have them now. The fruit only passed through one tank, is my recollection. And then it went to these brushes. They were fixed on a table like that, with a gradual slant to them, and they are revolving all of the time; they were in a screw-shaped thing, you know, that would naturally carry them down. The brushes were spiralled. And the fruit went down between each pair of brushes from the upper end of this series of brushes [fol. 607] clear to the other end. I suppose they were twenty to twenty-five feet long. By the time an orange started up at the upper end, and with that sooty mold, everything on it, by the time it got down to the lower end, it would be polished and cleaned.

Q. Well, when the fruit was clean, as I understand it, they didn't bother washing it in that house?

A. No, sir. You see, when it would go down to a certain place, after it got through these brushes, it would drop off; a place for them to drop off into the bins, and there it was wrapped and packed.

It has been about four years, I think, since I retired from active business. I moved to DeLand last October; last October a year. I moved there from Umatilla, after I sold my properties in Eustis, I went to Umatila, I bought Mr. DeVault's place, president of the bank.

Redirect examination:

Q. Do you remember whether or not they used wax in the process that you have described?

Mr. Massie: Objected to as improper redirect.

A. I don't recall. I never saw them use wax; they may have done it: could have done it, and I not known anything about it.

H. H. ALLEN

H. H. ALLEN, of Eustis, Florida, a witness on behalf of the defendant, American Fruit Growers, Incorporated, having first been duly sworn, testified as follows:

Direct examination:

I am a fruit grower. I knew Mr. Pond who was at one time manager of the Eustis packing house. I was director [fol. 608] of the Eustis Citrus Growers Association at the time that he was engaged as manager there; and I met him shortly after he came there. I do not remember what year that was. My recollection is it was around twelve years ago, something like that, but I could not say definitely. I was an orange grower at that time. I had my fruit packed in the packing house of the Eustis Citrus Growers Association—the one that Mr. Pond was manager of.

Q. Do you know whether or not Mr. Pond made a practice of washing the fruit when he was in charge there?

A. Did he make a practice? Yes, sir. He had a mechanical washing machine.

Q. Do you know whether or not he used anything in the water in the washing machine besides just plain water?

A. Yes, I know he tried out some various compounds.

Q. Do you remember what any of these compounds were?

A. Well, I heard him remark at one time that he was then using some of "Grandma's" washing powder.

Q. Do you recall anything else?

A. Well, the only thing that I know was that I noticed a pile of packages of borax there in the store room under the office. We had to go through this room in order to reach the stairway going up to the office; and I noticed the stuff piled along the wall there; and also some cakes of paraffin laying t. piled up.

The paraffin was used in the polisher. The polishing machine was a sort of spiral brush, somewhat similar to

the type of washers they use now; and this was dry, and the cakes of paraffin lay along the outside, and the brushes [fol. 609] rubbed against this, and put it on the fruit as it passed through. I have never been in the packing house business myself. I was in the house at Eustis quite a number of times during the season when Mr. Pond was in charge there.

Q. How did the fruit packed by Mr. Pond at that time compare with other fruit from the same vicinity as regards to decay?

Mr. Massie: Objected to as being without proper foundation in any testimony given by this witness; and it is leading also.

My recollection of it was that he was getting very good results. I knew he was topping the market in Boston right along.

When a grower sells fruit through a packing house that way, the packing house doesn't buy the fruit, only through the Exchange. The growers association is affiliated with the Florida Citrus Exchange. The grower gets the market price for the fruit, where it is ultimately sold in Boston, less the packing and handling charges for selling. That is, there is a charge for the packing and handling and the commission, and the rest is turned over to the grower.

I sold my fruit from the house run by Mr. Pond for the entire time that he was there. I don't remember precisely how many boxes of fruit I sold through the Eustis house while Mr. Pond was there. Yes. I would have to look up my files for that information, but I had on an average of around thirteen hundred to two thousand boxes a year, I imagine.

(No cross-examination.)

[fol. 610] MINOS E. MILLER

MINOS E. MILLER, of Leesburg, Florida, a witness for the defendant, American Fruit Growers, Incorporated, being first duly sworn testified as follows:

Direct examination:

I was sub-exchange manager for Highland Citrus Sub-Exchange, and Marion County Citrus Sub-Exchange for about, I guess, twelve years; and also with the Leesburg Citrus Sub-Exchange the first year of its existence; it was absorbed by Highland Sub-Exchange the second year after the exchange was first organized. The Leesburg exchange was absorbed by the other in 1910.

I knew a Mr. F. S. Pond, who was manager of a packing house at Eustis. He was sub-exchange manager at the time I knew him. That packing house was in the district of which I was sub-exchange manager. I was very frequently in the packing house of which Mr. Pond was manager. It was my business to visit the various packing houses in my district. Mr. Pond washed his fruit at that packing house, both at Tavares and at Eustis. Pond also managed a house at Tavares. He was manager of the packing house at Tavares as well as I remember two years before he went to Eustis. He built the packing house at Eustis, and was the manager of it for I think two years there. Both of those houses belonged to the Highland Sub-Exchange.

Q. Do you know whether or not Mr. Pond used anything in the water in the washer tank?

A. Yes. I know he used borax.

Q. Do you know for what purpose he used borax?

A. To prevent decay of the fruit.

Q. At which of the packing houses did he use it?

A. Both Tavares and Eustis.

Q. Do you recall discussing this use of borax with Mr. Pond at any time?

[fol. 611] Mr. Massie: Objected to as calling for hearsay testimony.

Q. You may answer.

A. Yes, I remember discussing it with Mr. Pond on a good many occasions, but he, as I understood, was not the originator, or the first man to use borax in the State of Florida in packing houses for that purpose.

Q. Just state as near as you recall what Mr. Pond said to you on this subject.

Mr. Massie: Same objection.

A. Well as well as I remember, Mr. Pond knew about the use of borax for that purpose before he came to Florida; he was brought to Florida as an expert packing-house manager, and just as near as I can recall it now, it was his custom to use borax in California for that purpose; and there was nothing—there was nothing said about it particularly; it didn't raise very much disturbance or interest. He went ahead and used it right in the pasking house at Tavares first year that he came there. I say that he knew what he was doing; knew what borax was—what it was good for. And I know that it was a question in there because no one else was using borax so far as ever I heard. It created considerable interest after it got noised abroad what he was using it for. I think it was the fall of 1912 we had an unusually wet fall, and Mr. Pond, I think was at Tavares in 1911 and 1912. Now, as well as I remember, it was the fall of 1912, we had an unusually wet fall, there was a tremendous amount of decay in the fruit; you would go into a grove and maybe fifteen or twenty oranges hanging on the trees absolutely rotten covered with blue mold; and when we would pick the fruit and bring it to the packing house, before you could run it through the washer, there would be a lot of decayed fruit in the field boxes, before the fruit was run through the packing houses for the purpose of cleaning [fol. 612] it. And that was Mr. Pond's object in using borax, to keep down decay, prevent decay, and to prevent—some oranges of course, in picking fruit, lots of oranges will be clipper cut and scratched, thorned on the side of the fruit, and as I understood Mr. Pond to say, the use of borax would prevent any further decay. That was his object in using borax; and no other object, as I understood it. It was not to clean the fruit.

Q. Did you ever see Mr. Pond put the borax in his washer?

A. I did. My office was not over 100 yards from the packing house, and I very frequently go down to—I would be there early in the morning, and I have seen Mr. Pond and the men who were working under him, put the borax in the vat, in the soaking tanks. I have seen that with my own eyes.

Q. Do you know how much borax Mr. Pond used?

A. I could not say definitely, but I should think not less than some five to ten pounds to a big tank of water. It would have a discoloring effect as soon as while—while it was dissolving in the water, it would make the water look kinder milky white color, but that would soon pass away of course.

Cross-examination:

It was at Tavares, that I saw this borax added to the tank by Mr. Pond. I never saw it put in the water at Eustis. Eustis was five miles north of Tavares, and I was not there at the time the borax was put in the water at Eustis, but I have understood from Mr. Pond the practice was generally known there, that Mr. Pond used borax originally.

The water was supplied to that tank in Tavares by a pumps. There was an iron pipe run from the packing house into Lake Dora. Lake Dora is about forty or fifty feet away from the packing house; the water is pumped from [fol. 613] the lake into the vat, soaking vat. I could not say positively that the water went directly into the tank, but I dont' think it went through something else before it got to the soaking tank. It might have had a strainer, that is to strain out any trash before it went into the tank, but I don't think even that. The pipe ran out far enough into the lake away from the grass and weeds, so that there would not be any trash.

I think it was not the custom in that house to use the water from the cooling-jacket of the gas engine to use in the soak-tank. I am no machinist; I don't remember the exact modus operandi of the proceedings, but I know that they got their water out of Lake Dora; whether it was strained or not before it went into the soaking tank, I could not say positively, I am not sure as to that.

I am not able to say positively that the water didn't first go through the cooling-jacket of the gas engine before it was run into the soaking tank. I don't know; I really could not say. I don't know whether the tank had an overflow.

I know they kept the water at about a certain height in the tank all the time. I remember that, but as to how they managed that, I don't know positively. For all I know they may have had an overflow for that purpose, because I could

not say. The water was warmed. They had an iron pipe that run from an engine through this—from the engine into this tank, that would warm the water; I remember that; the water was quite warm in the tank, soaking tank. I don't know exactly how much water the Tavares tank would hold, but it was a wooden tank, made out of heavy planks perhaps ten or twelve feet long, three or three and a half feet high, and about the same width, three and a half to four feet wide.

They had an endless chain that carried the fruit out of this tank up into the place where the oranges were assorted, [fol. 614] as well as I remember. I remember seeing the oranges coming out of that tank, going up that chain belt up to the place where the graders would grade the oranges, pick out the different colors, you know, and different sizes; and the oranges then would run into little chutes into the bins along there on either side of the place where the packers would pack the fruit. It was soaked in that tank, and they had brushes of some kind that the fruit would—those brushes were turning constantly turning, and as the fruit would touch those brushes it would rub off the soot and mold and discolorations.

I am not quite sure where those brushes were, but I believe that they were not in the water tank, I remember that; they were not in the tank of water, but between the tank and the shelves, along up twenty or thirty feet away from this tank, and those brushes, the fruit was carried through that cleaner, and those brushes were revolving, and of course every side of the orange would be touched by the brush, and that would take off the discoloration and dirt of one sort and another. Those brushes were pretty wet. The fruit would be perfectly wet, you know, as it came out of the tank; it was stiff, very stiff brush, made out of this Florida saw palmetto, and it would scratch the skin off your hand if you held it there very tight, but the weight of the orange would not, of course—would not be heavy enough to cause any injury to the fruit as it would touch that brush. I had nothing to do with the machinery of the house; had nothing to do with the running of the house; I merely walked through it. That has been about twelve or fourteen years ago, now, that I saw that; saw the operation put through.

As well as I remember there was a pipe on each side of that rack or frame that sprayed water on the fruit so as to keep it perfectly moist and wet while those brushes were touching it so as to get every bit of the dirt off of the [fol. 615] orange before it went up on the grading belts, grading plank, grading platform. The fruit was thoroughly cleaned before it reached the hands of the sorter. It was thoroughly rinsed off by water.

I saw them dipping the borax out of the box or half-barrel. I think there was a box about the size of—half-size of a cracker box. At first they weighed the borax so as to get an idea about how much a certain quantity would weigh, and then they would know about how much to dip out and put into this tank. I didn't weigh it myself; I saw them weigh it, though. I knew; and as well as I can remember it was not less than, perhaps somewhere between five and six or seven pounds of borax that was put into the vat. I am speaking entirely from recollection on that but I saw it, of course. I am speaking entirely from recollection on that, to the best of my knowledge and ability, I am. I was there and saw it used. They didn't weigh it very frequently. I am not quite positive how often they weighed it, but I remember seeing it weighed once, when Pond first commenced using it. I know there was a crowd of men standing around watching the process, and Mr. Pond told them what he was doing—what the borax would do with the blue mold; and he said he wanted them to put so many pounds in that much water; and he weighed it in order to find out just how much, what quantity it would require to weigh so many pounds.

I am not positive when Mr. Pond came to Tavares, but I think it was the year—I think it was 1911, his first year there. He stayed there two years, and he went from there to Eustis, and I think he was at Eustis two years. I am quite positive they continued to use this process I have described all the time Mr. Pond was there at Tavares. Of course they were governed considerably by the amount of de- [fol. 616] cay in the fruit, as to whether they used it regularly or not, but if they felt like it was necessary to use it; if there was scarcely any decay present why they would use it; if a lot of oranges would come in that had no decay in it, as well as I remember, they would not use very much.

They might have used a little bit, but not much of the borax; but they did use it quite frequently; I know that because I could see from the looks of the water that it had something in it, and Mr. Pond said it was borax; and as I said awhile ago, I saw them putting borax in it on more than one occasion.

I am not sure they used any washing powders; I don't think they did. They might have used some washing powder to help clean the fruit; I don't remember about that particularly. It seems like as well as I remember, they did use some kind of a soap preparation, but I could not tell you what it was now. I don't know whether it was Pearline or Gold Dust, or what it was, but I think they did on several occasions use something besides borax, but that was to clean the fruit; not to prevent decay.

I never heard or have any recollection whatever of Mr. Pond using anything like permanganate of potash. I really could not tell you what they used to sterilize the field boxes; it seems to me like, I know they did use something for that purpose; I know they would stack, fill the car full of field boxes, close it up perfectly tight, and put some preparation in it; I have forgotten now what it was; it wasn't borax, I know that. This was done at Tavares.

It has been nearly three years now since I have had any very close work with packing houses; I am not connected with any packing concern now. I have been in packing houses once or twice during the last three years. Several of them. I don't remember of any house now using borax or any other preparation to keep down blue mold; they may, [fol. 617] I don't know; I haven't been interested enough in it to pay close enough attention to it. I don't read the various citrus journals. I am not interested in that at all. Occasionally I get hold of a copy of one, but very seldom. Maybe it has been six months since I have seen a citrus journal. Occasionally I see a copy of the citrus journal.

I don't belong to the Horticultural Society. I did several years ago; I don't now. It has been, I expect, four years since I was a member of the Horticultural Society, I should think. Four or five years.

I don't remember having seen any of the horticultural journals in the last couple of years. I may have, but I didn't take enough interest in it to impress it on my mind.

I get an occasional copy of the Florida Grower, published at Tampa. But I haven't taken very much interest in fruit business since I quit the sub-exchange office.

I have a small grove at Orange Bend, about seven miles east of Leesburg. I have been selling my fruit on the trees for the last three years.

Last year it was packed, I think, at Leesburg, I am pretty sure it was. I sold last year to Mr. Peter—E. B. Peter, last year. Peter operates his own house. He is an independent. I sold one year to Mr. Chester Lee—J. C. Lee, of Leesburg.

After Mr. Pond left the packing house there at Tavares I don't think they continued to use the same process he had been usirg there at Tavares, but I could not say positively. Mr. Pond and the manager of the house, the man who succeeded him, didn't get along very well together; they had a fight at the packing house one day—it wasn't about the use of borax, though. But I don't think Mr. Booth, as well as I remember, I don't think Mr. Booth continued to use it. In fact, there *was* wasn't very much decay in the fruit after Pond left Leesburg. After he left Tavares there wasn't as much decay in the fruit for some cause or other, as there [fol. 618] was the year that he was there. That was the worst year for the decay of the fruit I have ever known. It was terrible. That was from weather conditions, though. I know this, that Mr. Pond's record for low decay was far ahead of any other packing house manager in my sub-exchange. I remember that very distinctly. I don't think he had some years not over one per cent. decay, and maybe another year a per cent. and half—one and a half per cent. But he certainly made a record for an up-to-date packing-house manager, and he attributed his low decay to the use of borax.

He was in the habit of handling the fruit pretty carefully. He was a careful man. Everything had to go just exactly like he said it, or if it didn't he would raise a row right now.

He required the handling of the fruit—he required the pickers to use gloves when they would pick the oranges; he would buy gloves by the dozen—these white cotton gloves; and he required the foremen—the field foremen, to see that they didn't pour the fruit into those field boxes so as to

bruise it; and he required the man that unloaded the wagon, that brought the fruit to the packing house, to use every care in lifting and emptying the boxes as carefully as possible, and in pouring the fruit into the soaking tank; and required them to be very careful so as not to injure the fruit in pouring it in. He was a very careful man in his work. The graders had to use gloves, too. And every man that touched an orange had to have gloves on; even the packers that packed the fruit had to put on gloves.

Every orange that didn't come to grade, up to a certain grade, why, it was thrown out and hauled out in the woods. If there was a scratch on the fruit that amounted to very much it was thrown out with the culls. He made all of his force handle the oranges like eggs. Handled it almost the way he would dynamite. Just as careful as possibly could [fol. 619] be, and he tried to impress it upon those who worked under him.

This material that Mr. Pond put into the tank there at Tavares was dipped right out of the container and put right into the soaking tank.

The water was rather warm. The water was warm, as I understand it, before the borax was put into it, so that it would dissolve better.

As well as I remember it, they used a little tin scoop like a flour scoop. They would just scoop it out of the box and scatter it around over the surface of the water in the tank, and then take a stick, something like a broom-handle, and stir it, and get it thoroughly mixed into the water.

J. C. Thompson

J. C. Thompson, of Tavares, Florida, a witness for the defendant, American Fruit Growers, Incorporated, was called as a witness, and being first duly sworn, testified as follows:

Direct examination:

I have been living at Tavares since 1911; November, 1911. Before that I lived in Chicago. My present occupation is that of mechanic contractor. I do mechanical work, and

contracting business. I have had something to do with the citrus fruit packing industry.

My first connection with that industry was as machinist and house superintendent at Tavares. The name of the house was The Lake Region Packing Association. I had charge of receiving the fruit; shipping it out; looking after the wash water in the tank, and generally outside of the packing. Everything outside or inside of the packing aisles I had charge of. In other words when I got it out onto the [fol. 620] grading table, ready to go into the bins, I turned it over to the foreman, house foreman. I had charge of the operations of grading. Then it went in charge of the house foreman.

We washed the fruit at the packing house; we had a Parker washer. It is just square box with four rollers in it; four rollers with fiber brush on them, kind of spiral, carries the fruit down there (illustrating with his hands); cut kind of octagon on the rollers. The fruit come out of the soak tank when it went into the Parker washer. We run it up a conveyor to knock the leaves and sand out of it; and then it went to the soak tank. We put the fruit first on a conveyor to get the leaves and sand out, and that went into the soak tank. It gets out of the soak tank on rollers—live rollers, a roller elevator carried right up into the washer. All of that part of the operation was under my direction.

We used cold water in the soak tank as a rule; once in a while put a little warm water in, if we got hold of a batch extra dirty, some of that kind. Sometimes when it had a batch of scale on it, thought maybe that might loosen it up a little. We got the hot water out of the boiler. Hot water boiler, the condensation out of the dry box. Throw direct steam into the wash water, into the tank, or cut it off either way.

Q. Did you use anything in the soak tank besides just plain water?

A. Yes, sir.

Q. What did you use?

A. Sometimes we used soap powder in it. If we got a dirty batch, and warmed the water first.

Q. Well, did you use anything else?

A. We used borax in it, when they got bad decay.

Q. How long were you employed there at Tavares packing house?

[fol. 621] A. You see I was there from '11. Latter part of '11 until '15 or '16, '17—'17, I think.

Q. During what part of that period did you use borax in the soak-tank when the decay was bad?

A. Now, I don't know, sir, as I could say, but whenever we would notice any fruit that looked bad and started to decay. Used to get a great deal of it that came from Emerald Isle, Umatilla, Highland Grove, and off up there; I would look it over, and if I thought it needed something I would put it in, put the borax in the tank. I would dissolve the borax in a bucket.

Q. You kept up that practice the whole time you were there?

A. Yes, sir; all the time I was there.

Q. What sort of bucket did you use to dissolve it in?

A. About a twelve-quart bucket, something like that, galvanized bucket, I would put it in.

Q. About how much borax do you think you put in?

A. I put in about six packages I think, of pound packages, and it made the bucket about half or two-thirds full, or something like that, I don't just remember, something like that, I don't know.

Q. Did you always get your borax in packages, or did you sometimes get it in bulk?

A. No, sir; sometimes got it in bulk; but I believe that was once or twice I remember getting it in bulk; I think it come in a keg, if I remember right, small keg.

Q. Did you use hot or cold water to dissolve the borax?

A. Well, sometimes used hot water; if I was in a hurry, used hot water or cold water either way I get hold of it. It I could get hold of water easy, I would use hot water.

Q. Where did you get the idea of using borax when the decay on the fruit was bad?

[fol. 622] A. Well, I think there was a man from Gainesville that told us about it, sir.

Q. Do you remember his name?

A. Well, I don't dare say whether it was Watson, seems to me it was; anyway he walked lame; he was a lame man.

Q. Do you think his name was Watson?

A. I think it was. He walked lame in one foot, I think the right foot, if I remember, a little short, kind of bent it up this way when he traveled.

Q. Did you observe whether or not the borax helped keep down decay?

A. Well, I don't know if it did—we thought it did. I know—I will tell you one instance of Mr. Boyd who was one of our foremen. All right for me to go ahead and tell it?

Q. Go ahead.

A. Mr. Boyd was one of our foremen one year, and he would often come around and ask me if I had the borax in there. I told him I had put it in. "Well," he says, "they claim they are getting pretty heavy decay," and I know I would replenish it after dinner, if we had a heavy run, if we had to put in any extra water after dinner. Unless it came up to a certain amount of water in the washer, I would replenish it, put in a package or two after dinner, and dissolve it in the bucket likewise, like I did in the morning.

We had a polisher. The Parker polisher, and we used paraffin wax in it in troughs. We had troughs setting in the sides of it, and connected with springs in it to hold the paraffin wax under it. Split the paraffin in little strips about six inches long to half inch wide, two and a half inches deep; set that up in a trough; had springs in there to hold it up against the brushes.

The brushes were setting kind of horizontal, five trenches. I think there were—one, two, three—I think there were five [fol. 623] trenches in the polisher, and the oranges went over the brushes. Paraffin wax went about half way down the roller, the brushes, and then they left the rest of it clean, after it went over the paraffin.

Q. Do you know whether they had used borax at Tavares before you went to work there?

A. Well, they claim they had.

Mr. Steward: Objected to as calling for hearsay.

We bought the borax that we used up there at the local stores, and I think one or two batches we got from Jacksonville, but we used to buy it at the stores. Groceryman by the name of E. P. McCullum, a dead man, died about three months ago there at Tavares, he kept a store there for a good many years. We kept a stock of it on hand; generally kept a box or two on hand. Kept it in the store room. I had charge of the store room. I carried the key for it.

I have had charge of a packing house since I left Tavares. I had charge at Winter Haven for H. T. Montgomery & Sons. That was five years ago this winter, I believe. Yes, sir; five years this winter.

I could not exactly say how much water I put in the soak-tank—I never measured it, but I used to put it in, and the tank was about thirty inches wide, ten feet long, I believe, and something like two feet deep; I used to put enough in it there—we used to dump in—well, the tank held about twelve to fifteen boxes of oranges, half box, little box about that high and about that long (indicating) and they would be within about four inches of the top of the tank when we were running. When I got the fifteen boxes of oranges in the tank, it would raise the level of the water, about four inches of the top. I never did take any pains about it exactly how many boxes. Throwed them in until I got it full and stopped.

[fol. 642] Cross-examination:

This tank I have described as thirty inches wide and ten feet long, and two feet deep, was the tank at Tavares. There was only one run-way, one set of rollers to empty the fruit out on the washer, and on the washer there are four runways. That would be five rollers—brush rolls, four runways. They just brush the fruit and clean them. They don't put much water on the brushes when we wash them with borax, very little. They put water on the brushes when they were dry; yes, sir, but very little when they were using borax on them in the wash water. The brush rolls were I think eight feet long, to the best of my recollection, I think that is about an eight-foot washer.

The rollers out of the soak-tank were about seven feet long, if I remember right, and came within about three and a half or four feet from the far end of the soak-tank, you see out to — washer kinder horizontal that way. I mean the roller conveyor. Yes, out of the soak-tank to the washer. And that roller conveyor carried the fruit out of the tank, and then went horizontal right to the end of the washer.

The water was supplied to these brush rolls of the washer by means of spray pipes hanging out over them. I think there were only two. They run crossways. They were connected with a tank on top of the house; had a little small tank upon the top of the house, held about 150 or 200 gallons.

I got the idea of using borax in the tank from a man from Gainesville. He was one of the horticultural men at Gainesville; he was always around giving advice how to handle

fruit; all that sort of stuff. I could not just say when he give me this information, to tell the time, it is so long back. Well, I went in at Christmas time, in the spring time, it was getting warm weather. Eleven, I believe; '11. It was the spring of 1911 that this man from Gainesville told me that. [fol. 625] I think so. I might be mistaken, but I think that is when it was, along that time in the spring. He was a horticultural man, or entomologist, something, whatever you are a mind to call him; he was something of that kind. He was a state employee. The state had an experiment station at Gainesville. I don't think he was any inspector; he just come around to advise people how to handle stuff, and how to get by with it. Later on he came and told us how to make insecticide, to give you a better idea what he was.

I was not there to Tavares when Mr. Pond came, I come there after Mr. Pond left. I could not say what his initials were. I would not dare to say; I might not get it right. When I was in Tavares he was in Eustis, I believe.

The material I added to the tank I first mixed up in a bucket. I never added it directly from the boxes that I had; put it in a bucket and dissolved it. I never added it directly to the tank. I always did that myself. I carried the keys to the storehouse. I can state why I did that. We had cyanide of potassium in there and sulphuric acid to fumigate the field boxes; afraid somebody might get in there and mess with it, you know, get hold of it; and I carried the keys at that time to the house in general.

J. B. Booth was the manager there at Tavares when I was there. We quit at the same time, in '16 or '17, something like that; I would not dare to say when it was, but I think it was '16 or '17 when I quit; '17 I think.

The water stood something like ten or twelve inches deep in the soaking tank at the Tavares house before I dumped the fruit. And I put in fifteen half-boxes—twelve to fifteen half-boxes. I could not just say, but it was somewheres in that neighborhood, you see. I think that would bring the water up to within four or five inches of the top. [fol. 626] To the best of my recollection I think it did; it is a long time back, you know. I am pretty sure, because I was at it a long time, you know, and always looked after that business; always looked after the washer, to see that it was washed out, refilled with water to a certain depth and stuff put in, and looked after generally.

You see the rollers were quite wide, and then the end of them laid down in the water, and we put the water in before we put the rollers down in. Had the rollers, you know, hung up with block and tackle to wash it out, and we put the water in, and let the rollers down again after we had the water in, and the rollers have to swell it up, too. If you got too much in it would splash out all over you; splash out all over the floor and waste it; we didn't carry a great deal of water. I don't think it might require more than twelve inches, because if we had put in more than that—got in more than about so high, the fruit would splash it out over the floor. It was a small tank, you see; a narrow small tank.

The tank was thirty inches; the rollers came out the side and rolled up on top of a two by four, rollers just about as wide as the tank, thirty inches, I believe. Just a two by four down a little inch board up along the side to carry the fruit and guide it. It was a homemade arrangement.

The machinist that had my job there at Tavares before I went to that packing house was Walter Robinson.

We used washing powders at the Lake Region packing house to scrub union suits, gloves, and picking bags, all that sort of stuff. Sometimes we used it in the tank, but not to speak of. I could not say how much we did use of it. We used some kind of a soap-chips more than it was a powder. Kinder little old flakes about that big, you know. I don't remember how much we used. I just put [fol. 627] — in with a little small shovel, I put some in. I used to do that occasionally for this scale, but I don't know that it ever done any good.

Those soap-chips come by the barrel, I believe. They come by the barrel. Swift & Company, if I remember right, made it, or Armour, or something like that.

Redirect examination:

The soap preparation that we sometimes put in the tank was the same that we used for washing our gloves and picking bags, etc. Regular soap-chips. We didn't use it to speak of; once in a while tried out on a batch, if we got a lot of old scale and stuff. Usually scrubbed that off by hand.

ALBERT E. BARNES

ALBERT E. BARNES, a witness in behalf of the defendant, American Fruit Growers, Incorporated, having first been duly sworn, testified as follows:

Direct examination:

I am a fruit grower. I have been connected with the citrus fruit packing industry. I was first connected with that industry in 1900 in California. My first connection with the industry in Florida was with the Florida Citrus Exchange as inspector. I was not connected with any particular packing house when I was inspector. In 1914-15 I was connected with the Auburndale Citrus Growers Association; in '15-'16, with Ocala Citrus Growers Association. The house of the Ocala Association is located in Ocala. I was manager.

In packing our fruit at Ocala we washed the fruit. We had a Nye washer. It is an elevating washer; it takes the fruit from perhaps 15 inches and lifts it to the height of [fol. 628] the dryer, about 5 feet, and it washes it in elevating. There are three brushes—two brushes setting this way in the trough, and the revolving one that carries the fruit up out of the washer. The revolving one is like an endless belt; on an endless belt, the brushes are. The other brushes are stationary, with the exception they are setting on an incline, and the spring under the top end of them, behind them, so they will give or hold in a larger or small fruit going through them. They press on the fruit carried by the brushes on the endless belt.

The washer is kept wet by the bottom or dry end of it being in a tank; I don't know just the dimensions of those tanks, I never measured them; and that is the only one of that style that I ever had anything to do with operating. I should say the tank was somewhere from two to three feet wide and about five feet long. Smallest of any washing machine tank that I knowed of. The belt carrying the brushes is on a chain, a sprocket chain. A pulley is in the tank, a sprocket pulley, and chains to that running on these sprockets, and brushes around it. The brushes dip in the water as it revolves; as it comes down, the under brushes come through the water.

I would hardly know how much water I would have in a tank like that without seeing the tank and estimating. I should say eight to ten inches of water in the tank. It has been so long, that is ten years, and I never had thought anything particular of it, that I would hardly know close.

I used washing powder and borax in the water in the tank. I used, after I started to using it, or get on to using it regularly, I used a pound of Mermaid washing powder and a pound of borax every morning. I used to wash the tank out every night. I was at the Ocala plant just during the shipping season, I would say six months.

[fol. 629] Q. For what purpose did you use the borax and washing powder in the water?

A. Well, it was our idea that it—used it primarily for cleaning the fruit; that was the first.

Q. Did you have any other purpose in using it?

A. Well, under the conditions which we handled fruit at the Ocala house, which was all the way from twenty-five to seventy-five miles haul from the groves, the length of time we were getting it to the packing house, and the extra handling, caused a good deal of decay, and we figured that if there was anything that we could do to disinfect it, that we would do it, while we didn't know what they do now about the borax at this time, I am satisfied that the borax had something to do with the carrying of the fruit; elimination of blue mold, which is our greatest trouble.

Q. Did you find that it did help the fruit to carry?

A. I think it did; yes, sir.

Mr. Morton: That is all.

Cross-examination:

We handled about 700 to 900 boxes of fruit a day through that washer, and the maximum amount we put in more than an average working day, worked overtime. The water we used in that washer came from the city. Ocala city water supply.

I left that packing house at Ocala sometime in the late spring or early summer of 1916. I am not sure that it is still running; I don't think so. That was an Exchange organization, and I don't think they have a packing house there at this time. It ran for two years after I left it that

I know, but since then I don't. C. C. Boyd succeeded me as manager.

From Ocala I went on the road as inspector again; from '16 to summer of '19—'19. That was not my first experience as inspector. The earliest was in 1912. I came down here, as you might term it, an expert in the co-operative [fol. 630] way of handling the fruit from California; I had put in twelve years there with the California Fruit Growers Exchange; came here to work for Mr. Temple, who was manager, and I was kinder roustabout; they put me wherever they had a weak place; new association, and somewhere they wanted to pull up in a profitable way, that is where they put me; sorter of a roustabout. After 1916 I covered the whole State as inspector. That is the citrus-growing part of the State. It was my duty practically to inspect all houses of the State, that is the Exchange houses, for field work and packing.

Redirect examination:

The brushes went very close to the bottom of the tank; the return part of the brush did. If it got too much sag in the chain, the brushes would drag on the bottom, pretty close. I could hardly say there was as much as ten inches of water in the tank. I don't know just what the diameter of that sprocket was. I have never seen one of those washing machines since that time. Haven't seen a washing machine of that kind since that time. I am not certain that the shaft of the sprocket wheel was above the surface of the water, the axis of the sprocket wheel. It really must have been, though; I don't think that would run in water.

SHADRACH D. MANNING

SHADRACH D. MANNING, of Valrico, Florida, a witness in behalf of the defendant, American Fruit Growers, Incorporated, having been first duly sworn, testified as follows:

Direct examination:

My business at present is looking after groves. I knew Mr. B. F. Chilton. He is dead now. I don't know when

[fol. 631] I first knew him; about the year '90, I believe. He was living at that time in New Smyrna. I used to work for him. I worked for Mr. Chilton off and on ever since, but a regular job, only after—I think it was in '96 or seven, I began.

Mr. Chilton was a man that was a horticulturist when I worked for him; he taken care of groves owned by W. E. Connor, of New York. These groves were located in New Smyrna, Glencoe, Florida. When I started to work regularly for Mr. Chilton I began at what was known as the Jungle Grove up here two miles west of Glencoe, up near New Smyrna, up near Glencoe, and started with what was known as the Jungle Grove which is part of the Ronnoc Grove. There was no packing house at the Jungle Grove at that time. The packing house was built, as near as I recall, in 1903 or '04, I am not sure of that. I was foreman of the grove and the packing house there at that part, and I looked after machines and general foreman of the packing house.

Mr. Chilton died in 1910, I believe. No, let me see—1910 or '11, I am not sure about that. Yes, 1910, I guess. I continued to work for him up to the time that he died.

We washed the fruit before we packed it at the Jungle Grove. We had what was known as the Warner washer. It was a metal drum, with a casting around it that run on rollers; and there were cogs that connected from the belt and a shaft with belt above that run the washer; and the washer revolved on wheels in the bottom of the tank, run on this casting there with the cogs; and the washer was eight feet in length, the metal drum, and the box was two feet and six inches, I would say the one that we had, inside, by about, oh, thirteen or fourteen feet in length. This drum was made of galvanized iron. There was a kind of an extension rim or groove inside of the drum, in there [fol. 632] that come up, and there was a canvas, padded with burlap, that was used as a screw to drive the fruit down through the washer and sponges. This burlap acted as a screw to drive the fruit through there. Like an auger—this burlap was merely a cushion in between the metal and the canvas; the canvas was next to the screw, and this was more of a padding, this burlap was, that was in there, and that was laced down, to prohibit bruising the fruit.

The groove in the cylinder that acted like an auger was formed in the metal of the cylinder. As well as I remember there was a space at the opening where they put in the fruit of about three feet, and at the end where the fruit come out, at least two feet.

We had a lot of sponges, and we kept them on a rack; in fact kinder though that was overhead on this shaft that run the machinery, and the sponges were put up there; and we put in a lot of sponges, and then we put in our fruit; and we continued to put in fruit until it got sufficient pressure there until it worked the fruit out; and made it jump a little board, which was boarded up from the bottom up about two inches from the water, and the fruit and sponges were picked up, and the sponges put on the rack or trough, that went back to the vat, the water, and the fruit of course went on the drain on the outside. The fruit was taken out of the washer by hand.

The board come up within three to four inches of the top of the cylinder, and this board was a couple of inches higher than the water, so as this groove in this cylinder revolved, why it jumped the fruit over into the two-foot space there, and when it was ready to take out the sponges went one way and the fruit the other.

There were three or four inches between the top of the board and the top of the cylinder at the end where they lifted the fruit out. It depended upon the size of the fruit, [fol. 633] whether grapefruit or oranges. I don't remember just exactly. There was space enough for the fruit to come out over the top of the board.

Q. Did you use anything in the water in this washer?
A. Yes, sir.
Q. What did you use in the water?
A. What first we used just at the Jungle Grove?
Q. The one you have been testifying about?
A. Well, we used borax.
Q. When did you start using borax in the water?
A. Well, we began using borax in the water in the Jungle Grove, I could not tell, I don't know whether we used any the first season, but anyway the second season after we started that packing house there; I don't remember just when that was.

Q. Under whose directions did you use borax?

A. Mr. B. F. Chilton's.

Q. For what purpose did you use it?

A. Why, used it for blue mold and stem-end rot, to prohibit.

Q. For how long a period did you continue to use borax in the water at the Jungle Grove?

A. Well, as long as I stayed there—let me see—I don't know just when I left there—'13, I believe.

Q. You were there after Mr. Chilton died?

A. Yes, sir.

Q. How often did you change the water in your washer?

A. Oh, twice a week. May have been some instance we had tangerines, something like that, we would change, you know, this water, so as to have clean water for the tangerines, clean water.

Q. On an average about twice a week?

A. About twice a week.

Q. How much borax did you put in the water?

[fol. 634] A. Well, I don't know; it was either eight or ten-quart pail container, and I don't know exactly which, but it was a container that we had there.

Q. Who told you how much borax to put in the water?

A. B. F. Chilton.

Q. It is your recollection that you put an eight- or ten-quart pail full?

A. Yes; whatever the container that we had there, full. Now, whether it was eight- or ten-quart pail, I am not sure.

We made other use of borax at the Jungle Grove packing house, besides in the washer. The first thing we did in the morning was to—we had the bins, you know, three deep, and racks that rocked and bolted to piers in the packing house; and we only had one layer of fruit in each bin; and the first thing in the mornings was to get out all decayed fruit, and open up the packing house. You could tell readily if there was decayed fruit in the house by the odor, and we got that out; cleaned off the places where the fruit was mushy, cleaned that out; and then as soon as this fruit was packed up, why we taken a water pot with some of this borax water and sprayed the bins to kill whatever spores was left. That was a regular practice at the Jungle Grove packing house.

Q. Would the water that you put in the tank twice a week last you over that period, or did you have to replenish it from time to time?

A. We had to "replenish" you know, put back, to keep it up to a certain depth.

Q. When you replenished the water, did you add just plain water, or both water and borax?

A. I think that we used a little borax along; I am not sure about that, but I think that we put in a little borax along as we put in our water.

[fol. 635] The fruit was shipped direct to the consumers in New York at the beginning, but later on I believe Mr. Connor employed J. Pratt Carroll there, who was a commission man, and then afterwards we shipped in carload lots; and marked J. Pratt Carroll, with the customer's number in the left-hand corner of the box.

Carroll put this fruit, he looked at the customer's number; and of course he had a list there of names to correspond with these numbers, and Mr. Connor himself was customer No. 1, and then No. 2, on up. I think he had upwards of 2800 customers in New York City when I left there. Mr. Carroll inspected the fruit and repacked it.

When we first began we had considerable trouble with decay. We shipped quite a bit of fruit extra, and when we began using this boxax, after that we eliminated quite a bit of the trouble; and many times shipped a second car before we put in a box of pure fruit, but before that, oh, I don't think we sent as many as eight or ten boxes at a time to make good the decay.

Mr. Chilton had other groves besides the Jungle Grove—the Ronnoc Grove. Well, that was called the Ronnoc Grove, but he had three groves there; the one that I was at was the Jungle Grove, then the Home Grove, and then the Osceola Grove. They were all called Ronnoc Grove property. The word "Ronnoc" was simply the word "Connor" spelled backwards.

Mr. Chilton shipped fruit first from the Home Grove, we called it; the one there in town; in New Smyrna. I was working for him before the Jungle Grove was bearing.

Q. Do you know whether or not he used borax also at the Home Grove?

A. Yes, sir.

Q. He did use borax at the Home Grove?

A. Yes, sir; yes, sir.

[fol. 636] Q. Do you know whether or not he started using borax at the Home Grove about the same time he did at the Jungle Grove?

A. No he used the borax at the Home Grove first.

Q. Do you know where he got the idea of using borax?

A. I could not tell you. I don't know whether he got it in California or where, but some doctor—I found the formula that the doctor gave Mr. Chilton. I don't remember now his name, but I remember Mr. Chilton had been away for a month, but I don't just remember where he went, and when he come back he told me of this formula that he had that eliminated our trouble and decay of fruit.

Q. Well, where did you get the borax that you used in the washing at the Jungle Grove?

A. Well, I don't know where that was—I got it from New Smyrna; most of it was from the Home packing house, and occasionally it was brought right from the depot in New Smyrna out there. Now, where it was shipped from I don't know.

Q. In what sort of containers did it come?

A. Well, half-barrels, and we of course got a barrel or two out there, as large as a flour barrel, but usually just half-barrels.

I examined this morning parts of an old Warner washer. I believe the cylinder is about the same size as the one we used. I measured the cylinder this morning. It is 8 feet long by 29 inches in diameter, I believe. Our vat had more space on the sides, and it looked to be deeper than what this one looked to be this morning, because this was all knocked down here, and quite a bit worse for wear, but the—I think that we had a little more space on the sides than we would have on this one here this morning. The width of the one that we had this morning was twenty-four and a quarter inches, I believe. It is my recollection that ours was wider [fol. 637] —more space between the cylinder and the sides. I think that I had more room to put my arm down to clean out from under the cylinder than what there was in the one I saw this morning.

Q. When Mr. Chilton showed you this formula, did he tell you to make up your wash water in accordance with the formula showed you?

Mr. Massie: Question objected to as leading.

A. Yes, sir.

I could not tell you the average amount of fruit we shipped a season from the Jungle Grove. That is too far back for me to remember. Of course we began early in the seasons and shipped along; well, one year I know we shipped fruit every month in the year, but the amount of fruit I don't recall.

The grove was planted eighteen by twenty, and there was one hundred and twenty acres there, and I suppose we will say there was one hundred acres of trees that was bearing. We packed all the fruit from that grove at the Jungle packing house after the packing house was put up there.

This washer was outside the house at the Jungle house. When the fruit was taken out of the washer it was put on a lattice scaffold that was an incline that way, and stop board put down about eight feet down; and oranges were allowed to drop there and roll on down three or four feet farther and stop again, and kept going along that way until they were sufficiently dry just by the air and sun, in case it was shining, caused the fruit to dry. I suppose that shed was fifty feet long—forty or fifty feet, something.

After the oranges were dry they was taken off one by one and put in a basket and taken to the bins that I have mentioned awhile ago; and then the graders graded them; they had a stick, little like a penknife, that they got all of the scale off; and then the oranges were put into the bin, [fol. 638] up to the size, and so forth, and sized and packed. The fruit was polished at the Jungle Grove; the graders had a coarse cloth there; and oh, we did use a little para-wax on that to shine them up; there was no scale or anything left on the fruit, the stem and all, every scale was taken off.

The clearance between the bottom of the cylinder and the floor of the tank, as nearly as I can recall, must have been two or three inches. The clearance between the sides of the cylinder and the side wall of the tank was a good three

inches there, because I had room to get my arm down to get out, clean out from underneath there.

Cross-examination:

It was not the same as it is now; they didn't have a boss for everything; I looked after the picking, the grove work, the packing house; and I did all of my stenciling, kept the machinery going, and it would be hard for me to tell you how much time I spent in the packing house at the Jungle Grove, but I was pretty busy. I was kinder in charge there at the Jungle house and had the running of it under Mr. Chilton's instructions. All the packing was under my control.

I got over to the Home Grove packing house pretty often, because they had a vineyard there and a wine house, and I went when I really didn't have anything to do in the orange business, pretty often there; but whenever I got orders to go down there and see something, something about the machinery, or something like that, always on the go, and went to the office, why I visited the packing house I suppose once or twice a week, something like that, maybe once in two weeks.

The fruit was supposed to be packed and graded the same in the two houses, but the washing of the fruit, they used washing powders, and I don't know what all they did use in the water there; you see they clean cultivated, and [fol. 639] the fruit was very dusty and especially when the white fly come in, it got black; and that shell dust, and things like that, it was bum-looking fruit. Of course they changed their water maybe twice a day at times, but at the Jungle was a low land, it wasn't over four or five feet to water there anywhere, and they used just scythes and hoes for cultivating; the weeds and things grow immense there in that Turnbull hammock, so our fruit was naturally clean to begin with.

The trees were planted eighteen by twenty. Twenty by twenty, would be one hundred and eight trees to the acre; there was a little better than that, you see; I don't figure it up just the amount, but there was better than one hundred trees to the acre.

I helped out there at the Home Grove packing house only in the ways mentioned, just sometimes they had a little

trouble with the gas engine, or something like that, and I went down and helped them out if I could; and if I could not I let them know. I don't know how often I helped out, maybe once a month; I could not tell you; sometimes once a week, or once in two weeks; something like that.

I didn't pack a great deal of fruit myself at the Home Grove; just sometimes when we got in orders for a small shipment, why sometimes I would go in and pack eighteen or twenty boxes, or a fifty-box shipment, something like that. I didn't help to wash the fruit there, but I was around the washer and see them at it.

I cannot recall just what the annual shipments of the fruit were from the Jungle house. It would be hard for me to give even the approximate quantity. I think it run into thousands of boxes, but I don't know just how many. It was not one hundred thousand boxes, I know. I am no bookkeeper, you understand; I never made a letter in school in my life; and so long as I obeyed orders I thought [fol. 640] I had aplenty to do; but I don't know as to the amount shipped, I don't recall that.

They were shipping more fruit when Mr. Chilton died than when I started in at the grove. Shipped more every year. For the first two or three years they had no packing house; the fruit from the Jungle Grove, and also the Osceola Grove was hauled to the Home Grove. But after they got the Jungle packing house, they increased their shipments every year, got bigger and bigger.

I believe they had better success from the Jungle than they did the Home Grove, on account of, we don't know what, but they claimed they had to use so much washing powder and stuff like that in there, and they clean-cultivated there, and the fruit was very dirty, I don't know why, but we naturally had a better grade of fruit than what they had at the Home Grove. More fruit was shipped from the Home Grove, because up until these younger groves got to bearing Mr. Connor bought from people around, fancy fruit to work up his trade, at the same time he was growing the trees with this customer-shipment in view. There was more fruit shipped from the Home house at the time I left because from the Osceola Grove, you see, there was three hundred acres there at the Osceola Grove, so that there was more fruit from the Home Grove than there ever was at the Jungle.

I don't exactly know how much of the success in the shipments from the Jungle Grove can be attributed to the use of the borax method that I have told you about, but I know that we used to ship eight or ten boxes to make good the decayed fruit, to J. Pratt Carroll, and after we began using this we many times shipped a couple of cars, and maybe send a couple of boxes along. And absolutely all of the fruit that went through there was treated by this method. [fol. 641] During the season when we were shipping fruit from the Jungle house during those years that I was there, I personally had charge of this washing operation. Among the other people there that were working at the Jungle House was a fellow by the name of Baxter—Jim Baxter was a packer. Most of the packers were women; and the washer, they had an old darkey by the name of Evans; and had one by the name of Clemons. I think the old Evans was S. E. Evans. I don't know what their names was. "E-v-i-n-s" (spelling the name) I reckon; I don't know. Another employee of the Jungle house was William Churchhill; a fellow by the name of Kept worked there; W. G. Moore. "M-o-o-r-e" (spelling the name). I don't just remember all who did work in the packing house there. McCorkle—Arthur McCorkle, he was a packer, and his wife. Grosswidow there by the name of Eva Jones, I believe; and then there was a Henry Rutsky's daughter, called Fredrica, I believe, she packed there; and there was a McKenzie girl, and Melton girls, and old man himself, William Melton, worked in the packing house there. Pete Flinn. I don't begin to say that that is the beginning of the people that worked there but some that I remember.

These people that I have named had nothing to do with the washing of the fruit unless it was to take out and reline, something like that—no, nothing to do with the washing of the fruit—Oh, now, this "Evins" I told you about, this old darkey, and Clemons, they were the men there that washed the fruit. But they were under my personal direction and control.

Sometimes Mr. Chilton got over to the Jungle Grove and packing house every day and sometimes once or twice a week; sometimes he would go away for three weeks, or a month, but usually was on the job pretty well. At times he went away during the packing season. I was running the [fol. 642] house while Mr. Chilton was gone. Mr. Chilton

usually talked to me when he came over there to the house. He talked about what real estate was, concerning business affairs, and groves and numerous things. Kind of kept me posted generally on what he was doing. Kind of confidential, "confiat" or whatever you might call it. He talked to me about packing house methods and all. He kept me posted on what was going on over there at the Home Grove house. He relied on me absolutely to see that everything was going right over there at the Jungle Grove packing house. That kept right on up to the time that he died.

I spoke of sprinkling the bins and racks with borax water every morning. I continued that practice right along as long as I was there.

I was employed there in the Ronnoc Grove before the Home packing house was built. I wasn't there when they were being built. I were away. I were up in Madison County, and I was in and around that vicinity there. I was over there twenty-two years. My father lived there in Madison County. Madison County is, Oh, I suppose a couple or one hundred or more miles from the Ronnoc Groves district.

I don't know whether the packing houses there at Ronnoc Groves, that is the Home house and the Jungle house, were patterned after any other packing house when they were built. I could not tell you as to that. This was put up under—the one at the Jungle was put up under Mr. Chilton's instructions, but I don't recollect just where he got the idea; from some packing house he had seen, no doubt. I myself was not very familiar with the packing houses in that section of Florida; that is to know how they were constructed and arranged. Mr. Hart there, W. S. Hart at Hawkes Park, why Mr. Connor had his graders and all the packers to go down and have Mr. Hart demonstrate to them how to pack—wrap and pack the fruit; and [fol. 643] he had a very shoddy little packing house, but his way of handling fruit was what they wanted to impress upon their minds. I have never been much to run around. I went down to Mr. Hart's place myself. Mr. Hart washed his fruit; he had a washer. I could not tell you whether that was the same kind of washer that was used at the Jungle Grove. I could not tell you as to the washer. No doubt but what it was.

Mr. Chilton seemed to look up to Mr. Hart as a man who knew how to pack fruit. Mr. Connor more. Mr. Chilton went over there to Mr. Hart's place, too. Mr. Connor's instructions were to learn all he could from Mr. Hart about the packing of the fruit.

I am not familiar with the present-day methods of packing house operation and equipment. I haven't kept track of that; for the last twelve or thirteen years I have been practically in the field altogether. I simply look after groves; I take care of groves for people anywhere from Canal Zone to Vancouver, British Columbia; people who own groves, and bought formerly from the Valrico Land Company, and the business is run—known as W. F. Miller, Trustee, and I am the man that looks after the work and Mr. Miller is my partner in the business. The majority of those groves are in bearing.

I do not attend to picking the fruit. I am boss, you see. Is that plain enough? I tell the other fellow what to do. I do not boss the picking of the fruit. The American Fruit Growers has a man that does that. I am on the job to see that each and every man does a good honest day's work, or enough to satisfy me that the other fellow will be satisfied. These men prune, hoe, cultivate, harrow, tractor, spray, dust; anything that is to be done, fertilizer; anything that is to be done in connection with the planting.

I have nothing to do with the American Fruit Growers [fol. 644] whatever, no more than the growers there; the parties that own some of these groves own and control the packing house there, the American Fruit Growers is using the house at this time. I am not employed by those growers. Only the ones—some of them have other people to look after their groves. I control about three hundred acres, something like that; sometimes more, and sometimes a little less. Arthur Gunn is the man that runs that American Fruit Growers house there at Valrico. G-u-n-n (spelling the name.) Mr. Gunn does not boss the packing of the fruit. Mr. Jesse McClain does. I don't know that he is really under Mr. Gunn; of course they work together. Both are employed by the American Fruit Growers, or by the Valrico Growers, I guess it would be. The fruit is shipped through the American Fruit Growers, but the Valrico Growers pays their men.

It is a half-mile from where I am working to where this packing house is that handles the fruit from my groves. I have been in that packing house before it was built, and been on the ground, and been in it after it was built. When I want to take a look at a good-looking girl, I go in there; I don't have much business in there other than to see someone in there. My work is outside.

During that part of the year when fruit was not being packed at Jungle Grove packing house and while I was in Mr. Connor's employ I was pruning, budding, looking after the men. We sprayed after the white fly come; used a little Target Brand, I believe we used, then a little fish oil soap, and things like that, an old barrel sprayer; done but very little spraying out there. I mixed these different sprays we used. Mr. Chilton told me how to do that.

I can give some of the formulæ that he gave me for spraying the groves. Of course this Target Brand come, they used it one to sixty or seventy, I believe at first, and [fol. 645] we used it one to eighty—one gallon of that to eighty gallons of water. It was kinder, I suppose, a coal-tar product; I don't know; it turned the water something like this Fico Sixty, that is put up by Grossenbrecker; only then I believe that the Target Brand had a little more creosote or something like that in it, a little different, and it was for the same cause, same purpose. We also used a fish oil soap, and we did use a little lime and sulphur, but not much there in my time.

I was not acquainted with Mr. J. Pratt Carroll. I was never in New York to see how Mr. Carroll handled the matter of inspecting and repacking the fruit shipped from the Ronnoc Grove's Jungle packing house.

I mentioned some bins when I was giving my direct testimony. I mean the bins that the fruit went to after it had gone through the washer ready to be graded and packed.

I think the dimensions of the packing house there at the Jungle Grove were forty or fifty by one hundred twenty, I don't just recall.

Redirect examination:

Some of these groves are owned by people who liver at a distance from Valrico. The majority of them at this time

are in and around. There is a man named J. Henry that has a twenty-acre grove at Vancouver; let's see, it is about seven or eight years old, and Mr. Henry has never saw the land nor the people, don't know anything about it, except by correspondence, and a few photographs that have been taken.

Mr. Morton: We should like to state on the record that the parts of the Warner washer that Mr. Manning examined are two blocks from here up the street, and if you would like to examine them, I would be glad to take you up there.

[fol. 646] Mr. Steward: Are these being offered in evidence, Mr. Morton?

Mr. Morton: No, sir.

Mr. Steward: Well, does that mean Mr. Morton that they will not be offered in evidence at all?

Mr. Morton: They will not be offered in evidence.

Mr. Steward: Not at the trial either?

Mr. Morton: No, they will not be offered at all. I have nothing more. Do you want to go up and see those?

Mr. Steward: We will go up and look at it.

NOTICE BY DEFENDANT OF TAKING TESTIMONY IN FLORIDA

SIR: Please take notice that the defendant herein will take the testimony of the following named witnesses, to wit:

P. W. Roberts, Mims, Florida;
J. Z. Kyzer, Mims, Florida;
Mrs. Lillian R. Britton, Mims, Florida;
G. W. Holmes, DeLand, Florida;
J. C. Thompson, Tavares, Florida;
S. D. Manning, Valrico, Florida;
H. H. Allen, Eustis, Florida;
S. L. Harris, Eustis, Florida;
M. E. Miller, Leesburg, Florida;
A. N. Sandlin, Leesburg, Florida;
C. C. Boyd, Okahumpka, Florida;
Harold Bourne, Orlando, Florida;
Louis A. Allen, Miami, Florida;
A. E. Barnes, Miami, Florida,

[fol. 647] and others, each and all of whom reside more than one hundred (100) miles from the place of trial herein, and more than one hundred (100) miles from any place at which a District Court of the United States for the District of Delaware is appointed to be held by law, for use on behalf of the defendant at the final hearing, before a duly qualified notary public in and for the County of Orange, Florida, or such other counties in which the depositions may be taken, who is not of counsel nor interested in this cause, beginning at the office of American Fruit Growers, Incorporated, Orlando, Florida, on the tenth day of December, 1926, at 10.30 o'clock A. M. and thereafter from day to day at Orlando or at the places of residence of the witnesses as the taking of the depositions may be adjourned; and such testimony will be so taken in accordance with the provisions of Sections 863, 864 and 865 of the Revised Statutes of the United States and equity rules.

You are invited to attend and cross-examine.

Respectfully, (Sgd.) George E. Middleton, for Defendant.

Dated December 3, 1926.

To R. F. Steward, Esq., 700 Tenth Street N. W., Washington, D. C.

Service acknowledged this fourth day of December, 1926.
(Sgd.) R. F. Steward, for Plaintiff.

[fol. 648] Plaintiff's Depositions:

Testimony of William Sylvester Hart, Mrs. Laura Crews, and Mrs. Carrie Tanner, witnesses produced, sworn and examined on behalf of the party Brogdex Company, December 14 and 15, 1926, at Edgewater (Hawk's Park) and Mission City, New Smyrna, Florida.

Present on behalf of Brogdex Company: R. F. Steward, Esquire, M. C. Massie, Esquire, E. M. Brogden, Esquire, counsel of plaintiff.

Present on behalf of American Fruit Growers, Incorporated: W. B. Morton, Esquire, of Messrs. Pennie, Davis, Marvin & Edmonds; Chas. R. Pilkington, Esquire, counsel of defendant.

William Sylvester Hart

William Sylvester Hart, of Edgewater, Florida, called as a witness on behalf of the plaintiff, being first duly sworn, testified as follows:

Direct examination:

I was seventy-five on the twenty-fifth of September last. My residence is Edgewater, Florida, formerly known as Hawks Park. I am retired from business. I haven't any business, but I have been an orange grower, you know, and that was my most intimate business, although I have carried on several other lines. I have been a grower and owner of grove property. I have been a packer and shipper of oranges. I might say I have for fifty years. I have been here fifty-one years. Right in this immediate vicinity, within a few miles of here all the time. My groves were located here.

[fol. 649] I packed my fruit first at my old cabin up here on the back street, on the Dixie Highway, and after that down between here and the canal. I had quite a large packing house there on what is now the Shores, that new development down there. It was known as "Hart's Packing House." It was my own private packing plant, and all my fruit went under my private brand. I will show it to you (exhibiting orange wrapper); it was a "heart" with "W. S." inside of it. I am rather proud to say that that brand meant millionaire trade, and the highest prices of anyone in America. When that went on fruit they knew it was all right.

I withdrew from active business in the packing operations in February, two years ago, I believe, it was February 6th, 1924 (consulting records). The packing house is not being operated now. I sold that tract there for $35,000 to Mr. Bigelow. He sold it about fourteen months afterwards for $160,000, and I think he sold the packing house. That was part of the property that he sold, and that has been torn down now and it is being worked up as a subdivision—high-class subdivision. You came over it, if you came on the back road where those more modern houses are built down there.

I have known of a grove in this vicinity called "Ronnoc Groves" from its very beginning. I suppose that "Ronnoc" name covered what they called the "Jungle Grove" and "Oceola," too. My nearest point to it would be about three miles, I should think.

Mr. Ben Chilton was in charge of the Ronnoc Groves up to about—well, up to his death. I do not know just when that occurred, but it was somewhere in along after 1900 came in, after this century came in, and then later Mr. Niles and Mr. Kroon were made superintendents there. Both of them were sent to me before they went to work in the grove with the request that I would post them up and [fol. 650] instruct them as much as I could, with what time I could give to them, which I did—took them right into my packing house at different times, and then they were made superintendents, one in the Oceola section and the other of the Jungle Grove—Mr. Niles of the Jungle Grove.

I was very intimately acquainted with Mr. Chilton, so intimately that—we were neighbors, you know, and always discussed grove matters and anything of interest with each other whenever we met, and we used to go to the horticultural conventions together, and all that.

Mr. Chilton was a fairly well-educated man. He hadn't any high education, you know, but he was English-born. He came over and married his wife here in New Smyrna. She is alive and there now. Perhaps you don't know that and she might be able to give you some pointers. He was a man of sterling character; not a very forceful man, but a good, honest, reliable, substantial man, and made a very good superintendent.

My acquaintance with the citrus industry extends to places other than Florida. California, Cuba, Porto Rico, Spain and all along the Mediterranean, Egypt and the Holy Land; the Java orange, you know, they claim they have the best orange in the world there, and I have tested mine right alongside of it, and the same thing in Jericho. I have personally visited all these districts except Porto Rico; I have not visited there, but a very intimate friend of mine was the biggest grower in Porto Rico, and he wrote for me to have facts in regard to the development of it, you know, so that

we were in intimate correspondence. That was Mr. William Allan, of New York—A-l-l-a-n.

I recall visiting California, to investigate the citrus industry there. There were, I think, fifty of us men and women went over there, by invitation of the Citrus Exchange there, the fruit exchange, and the City Council gave us the Chamber of Commerce to hold our meetings in. We or- [fo]. 651] ganized and appointed committees to investigate different lines of citrus culture, and Professor Powell—although he didn't care for the name "Professor," or that prefix—took us in charge and showed us all around through Riverside, Redlands, Pomona and Azusa and through that section; well, all through that district of orange culture in California. Then I went up to Placer County, right east of Sacramento and the thermal belt up there where there is quite a heavy orange planting, four hundred miles north of the larger one south, and I went through the groves there and advised with the owners, and so forth. There were others among the party that went out there besides myself.

Dr. Inman, of Winter Haven, was the head man. He was the one that organized the party. Well, there were fifty-two. Perhaps I can give you a little list. Let me see if I have one in my pocket. That gives many of them (presenting newspaper clipping.) There is one of the places I have been to; that is up in Norway, a nice-looking town, too. That is the town of "Hell," Norway, but in their language that means "Light." It doesn't mean just what it does in ours. There is a little slip that I ran across, but it is only one of hundreds. There is a list of quite a number of the people that were on that trip.

(The list referred to is in the words and figures following, to wit:

"Mr. and Mrs. F. W. Inman, Florence Villa; Mr. and Mrs. L. B. Skinner, Dunedin; Mr. and Mrs. J. W. Sample, Bartow; Mr. and Mrs. H. E. Heitman, Fort Meyers; Mr. and Mrs. W. B. Gray, Tampa; Mr. and Mrs. Eugene Holtsinger, Tampa; Mr. and Mrs. Harry Benedict, Orlando; Mr. and Mrs. A. G. Smith, Wauchula; Mr. and Mrs. L. W. Tilden, Oakland; Mr. and Mrs. George Koplin, Winter Haven; Mr. and Mrs. J. J. Heard, Arcadia; Mr. and Mrs. Arthur H. Brown, Manavista; H. W. Ward, Winter Park;

[fol. 652] Col. E. R. Gunby, Tampa; Mr. and Mrs. A. C. Clewis, Tampa; T. C. Taliaferro, Tampa. Others who may intend to join the party should notify Dr. Inman at as early a date as possible, so that proper arrangements may be made.")

We studied their methods and conditions out there and then came back and had a horticultural convention at Daytona soon after and made report and there we arranged to organize the Florida Citrus Exchange, and that carried oranges, just the very fact of doing that, from forty-five cents on the tree that the Northerners were offering, and said they could not pay more, it went right up to seventy-five just from that one mentioned before the horticultural convention.

The name of Mr. Ben Chilton is not on the list. He did not go with us, but he was over — California; if I remember right, he made two trips over there at other times, but he was not with us.

On this trip that I made to California I took pains to investigate conditions out there quite thoroughly. I have done that several times. I was out there three years ago, on my way to Honolulu, and I stopped there and they took me about five hundred miles through the whole orange section there, you know, with a party—a party of Edgar Rice; he was editor of the Florida Grower, and got up the party. At the time of that trip, when we had fifty-two in the party, we went into the conditions and details of packing house operations there in California to a considerable extent and very carefully. We had a committee appointed for that special purpose, to study the different features, and in taking us about Mr. Powell would stop us before we went into a packing house, get up on the steps and tell us what special features there were worthy of note in that particular packing house, and what were considered undesirable, to avoid and so forth, and gave us all the information possible, and then we were invited to a meeting of the Ex-[fol. 653] change, and we attended a session of that and heard their discussions and whatever they had to say there.

Mr. Powell was the expert of the United States Department of Agriculture, G. Harold Powell. I had met him before. He came here to Florida, came to me before he went to California. Nearly all the experts of the Agri-

cultural Department at Washington, who were at all interested in citrus culture used to come to me first and talk over matters, study my methods and make tests of different kinds there and take photographs, and he was one of them.

I have newspaper articles, and there is while I was in California, something that was published. That is from Mr. Powell, and there is where he had cited my experiences, and my prices and my methods to the people there and spoke of them as "eye-openers." You see, before our agricultural experiment station—college and experiment station were established at Gainesville, they were in Lake City and they did not pay much attention to these things, and Mr. Painter and I was the experiment station for the State, and I got letters, thousands of them from all over the State and all parts of the country and Spain and Porto Rico, you see, so I was very well known to the Washington people, and, in fact, I have done some very good work there because of being so well known and sending agents to other countries to study up the enemies of the pests that we have imported from those countries and in such ways as that, you know, so naturally they came to me as one of those that they were looking up in Florida. The same way with the Agricultural Department here, you know, as I was the experiment station.

The Florida Citrus Exchange was not in existence before the time that I went to California with that large party. We organized that after we got back. We made a report [fol. 654] at the horticultural convention in Daytona, and there it was decided to organize the citrus exchange.

Q. And what was the general idea of those interested in that project; was it to adopt and use California methods, so far as——

Mr. Morton: That is a little more leading than necessary, I believe.

By Mr. Steward:

Q. (Continuing:) —So far as they were applicable here in Florida?

A. Yes, and that is what we did, and afterwards we had to make some changes, you know, to adapt them to Florida

conditions, and we had to have some changes made in the laws of the State to make it right.

Q. Now, while you were out there in California on this trip of investigation, with this large party of Florida citrus men, did you ever hear of, see or know of any use of borax out there?

Mr. Morton: I will have to object to that as leading.

Mr. Steward: That is all right, Mr. Hart.

The Witness: Shall I answer?

Mr. Steward: Yes, you may answer. Go right ahead.

No, I never did. We studied their washers there quite carefully, and their method of cleaning fruit, and there was no mention of borax, to my knowledge.

We wash our own fruit here in Florida. I was one of the first to wash fruit, and I used the barrel hung on a shaft, you know, turned with a crank, with soft, fine sawdust with it to remove the only discoloration we had at that time, which was a fly speck fungus, which I got identified by some of my friends in Washington. That, I think, [fol. 655] was the first time that it was identified, and I tried soap with my water first and then tried it without soap, and I decided that I got just as good results without anything in the water, and so I always used clear water—well water. The use of plain water was my practice always after the prior use of soap, and continued to be so down to the time I ceased to be active in operating a packing house.

There was a good deal said at one time about putting chemicals into the wash water, but there seemed to be the objection that all that they tried would eat up the lining of the tanks, galvanized iron, or whatever they happened to be, and so they did not get results that were worthy of continuing and so finally quit it, and that is the last I heard about any chemical to be used for that purpose. I did not continue to use a barrel washer through my practice. I used that two or three years and then I got a Warner washer. Mr. S. C. Warner, I think it is, of Palatka, invented a washer that went by power and I got one of those and I used that to the end of my work. His groves were known as the Esperanza Grove. It was opposite Palatka on the other side of the river, just a little beyond there.

I know how the fruit from the Ronnoc Groves was handled, because Mr. Connor came to me when he built his packing house, and built one on the lines of mine, which was original with me, the method of making bins and of grading fruit and all that and he adopted my methods as near as he could get his help, under inefficient direction, you know, to do that. I don't know what that packing house was called. It was the only packing house at first, and then later there was one built out in the jungle, as they called it. I don't remember how that compared with my own house, that Jungle packing house. I don't know that I went into it when I was there through the grove, so I couldn't say positively, but I am very well satisfied that [fol. 656] they had the same kind of tilting trays for grading fruit, you know. I think it was built along the same lines and with the same arrangements as mine was built here.

My advice was asked with respect to the equipment of those houses. As I was saying, Mr. Connor came to me for his plans to build them. My advice extended not only to the consfruction of the buildings but to the equipment, the machinery and the field boxes and the washer, and everything connected with it.

Mr. Connor wrote to me before Mr. L. D. Niles came here and told me that he was coming, and asked to have him come to my packing house and be under my instruction as long as I would care to keep him, and Mr. Connor paid the wages of all these parties, you know, I got the work free, so I was very glad to help out all I could, and I did so. Well, now, I don't know how soon Mr. Niles commenced his work as superintendent, but it was not long after he came here, because Mr. Kroon, k-r-o-o-n, came somewhere not long before or not long after, and they were each made superintendents, as I remember, one of the Osceola, and the other of the Jungle Grove, and, as naturally occurs under such circumstances, a little friction occurred between them, but they stayed on quite a long time and then later I think Mr. Niles left before Mr. Kroon did, and Mr. Kroon continued for a while. Then he went over to Porto Rico to work for Mr. Allan, Wm. Allan, this party that I gave you the name of in New York. He was the biggest planter of citrus fruits and nursery stock in Porto Rico.

Mr. Niles was in the Jungle Grove, out in Turnbull hammock. I spoke last night about sending my foreman, Gilbert Ballentyne, down with my crew to take charge of the Ronnoc Grove. Mr. Connor had insisted on his packers and orange graders, and so forth, following my methods. He considered mine the best that he knew of and he wanted [fol. 657] to bring the standard of his fruit up to that of mine, because I was getting so much bigger prices than anybody else that it was a worthy ambition, you know, and he insisted on his help following my methods. Well, they were rather indifferent and finally gave him the impression that they were old orange handlers and knew more about it than he did, a good deal, and so what he told them didn't have much weight with them, and he discharged the whole gang. Then he came to me and asked if he could send some help up to my packing house, and if I would instruct them, which I did, but it was near the close of the season and it did not last but a few days. Well I telephoned for him to come up, and I told him that the people he sent up there were not just the class that would make good instructors, they were not sufficiently interested, but that I would do better by him, if he agreed with my plan, which was to send my foreman and all my help right down, and let my foreman take charge of his packing house and run it for a while, at any rate, and he agreed with it very gladly. He said anything that I said or wanted done, it was all right it should go through, so I instructed Ballentyne to go down there and take the gang with him, and not to let down on my methods but to stick strictly to them, and to run that packing house on that plan, which he did, and Mr. Connor, the first day or two, walked around with him and got a good many ideas from Ballentyne, and the second day he stuck his hand in his vest pocket and handed him a $20 bill. He says, "This is not wages for you," he says, "this is just an extra." It made Ballentyne feel good, of course. Well, the result was that through that season—this was very late in the season, you know—they had never got over $4 a box for any of their fruit, which was a good, fair price at that time under those conditions, but from that time on they did not get less than $4 for anything, and they got from that up to between six and seven dollars, and he stayed [fol. 658] there and ran the packing house to the close of the season. Mr. Ballentyne stayed there and ran the pack-

ing house and my help that I had in the packing house stayed with him.

When I spoke of Mr. Connor firing the whole gang, that did not include Mr. Niles. Mr. Niles wasn't there. That was after he left. Now, Mr. Ballentyne was with me until 1908 or 1909, and I think it was the year before that this occurred. Ballentyne came to me in 1902, I think, and stayed until 1909. [Referring to account book.] Mr. Ballentyne operated temporarily the packing house right there in town.

I knew a fellow by the name of "Shady" Manning, connected with Ronoc Groves. I knew him by sight, and have talked with him, but never was at all intimately acquainted with him. I did not consider him hardly worth while. He was not really one that was interesting. I don't know just what he was doing, but still I think he had an overseer's position, or something of that kind; possibly superintendent of a part of the property. I could not say as to that.

Q. Was he the type of man with whom you think a man like Mr. Chilton would be inclined to have confidential relations?

Mr. Morton: I wish to put in an objection here. This is objected to as entirely incompetent; calling for an opinion of the witness, and leading besides.

Mr. Steward: Just read the question to Mr. Hart, Mr. Kennelly.

(Question read.)

A. Well, no, not as I understand "confidential" relations, the meaning of the word. He is not one that Chilton would be intimate with, further than as he was useful to him from his experience and connection with citrus culture. I think he is a "Native-born Cracker"; that is my [fol. 659] remembrance of him. I know that he was one of the two superintendents, and it must have been of the Jungle Grove, because Mr. Kroon was in charge of the other. I knew at the time, of course, and that is my remembrance of it.

I frequently discussed matters of common interest with Mr. Chilton. We used to like to get together for that purpose. I don't remember anything being used in the water in which the fruit was washed at the Ronnoc packing houses

more than simply as an experiment for the time being. I don't remember that I ever heard a chemical mentioned.

Q. If they had been using borax there do you think it likely that you would have learned of this through your association with Mr. Chilton, and your observation of what was being done at those packing houses at Ronnoc Grove?

Mr. Morton: I must object to this as incompetent.

Mr. Steward: Just go ahead.

A. I know I never heard borax mentioned, as nearly as I can remember—and I believe my memory serves me all right there, so that when it was brought up here a few weeks ago I was surprised that it was claimed that they had used it regularly as a preservative of the fruit.

Q. Is it likely you would have known of it if it had been used?

Mr. Morton: I object to that as incompetent and leading.

A. Oh, I feel very sure, because Mr. Connor and Mr. Chilton both were always eager to discuss anything of that kind with me, as I was with them, you know, so that it was really surprising to me when I learned from other parties that they had used it, so I wrote to Mr. Connor and asked him, [fol. 660] and, ordinarily, I have long social letters from him when I hear from him, but evidently he was busy, or had some reason, and he just wrote me that they did use borax in the early days in his packing house. He did not say what for, but stated they used it. I don't know when I received this letter from Mr. Connor. I think perhaps two months or more ago. I haven't that letter now. I sent it to the people that came to see me, and Mr. Niles has a letter that—has two letters that were written to me in regard to it after I had sent it to them, so you can see those. My memory for names, as I get older, is very poor. I sent the letter which I received from Mr. Connor to one of the three gentlemen that came here to see me in the interests of the American Fruit Incorporated, and the name commences with a "C", and has a couple of "L's" in it, I think. Do you know the party well enough to name him? It must have been Mr. L. C. Chapman.

Mr. Connor's full name and address is Washington E. Connor, Nassau Street, New York. I will give you the number (reading memorandum book); 31 Nassau Street.

He was Jay Gould's broker years ago, and has been on Wall Street or close to it all these years.

My old foreman, Arthur Wilkinson succeeded Mr. Ballentyne. He came back and helped me for a while, and then there was Mr. Houston who was my foreman for one or two winters, S. S. H-o-u-s-t-o-n. Mr. Wilkinson really preceded Mr. Gilbert Ballentyne in the position of foreman in my house. He was with me seven years, up to the big freeze of '94-'95, and a splendid fellow. Then I was caught in a lawsuit. There was a forgery to all my property down here, which took three years and $6,000 to win out, but I won out and got the most perfect verdict ever gotten in Florida, so one of the attorneys told me. So then I told him I could not afford to keep him longer, because most of [fol. 661] the work from that time on was skillful work, you know, that I could do myself—that I wanted to do myself, and so I let him go. He said he wanted to stay with me, for less wages or anything I would say, and I said "No, I think you are too good a man; I want you to get what you are worth. You are worth more than I can afford to pay you." So he left me in '95.

Was I acquainted with a Mr. Pond? Why, I know the name quite well, but I did not know—I never was at Eustis when he was in charge of the packing house there.

I have been either secretary or treasurer of the Horticultural Society in Florida for thirty-two years, from the second meeting until I finally got them to accept my resignation here three or four years ago. I was at the Eustis packing house during a convention of the Horticultural Society, and we were shown through the packing house, and talked it over a good deal. Let me see, now: It might have been Pond that was superintendent there at that time, but I was thinking it was another man. I cannot say positively as to that. I do not recall anybody telling me on the occasion of that visit that borax was being used in treating fruit in that packing house. I am very sure that that wasn't mentioned in my presence, or to my knowledge.

The fruit which I packed in my packing house had the reputation of carrying unusually well. For instance, Mr. E. O. Painter, who was editor of the Florida Agriculturist for years, and one of the very best-posted men on citrus culture, and cultivation and all that, and everything connected with citrus culture in this state was in Mr. M. C. Wom-

boldt's over in Jacksonville at one time. Mr. Womboldt had the highest class of tourist trade on citrus fruits of anyone in Florida, and he made my fruit the most attractive feature of his store for years, and we made a blanket price. It was so high that it would have astonished anybody the [fol. 662] beginning of the season, you know, and I carried it right through on those prices. Well, this Mr. Painter was in there and Mr. Womboldt was sort of re-arranging the office and he ran onto two boxes of my fruit that he had overlooked, that had been in there over two months, and when they found them both he and Mr. Painter were interested to know what shape they were in, and they opened them up and examined every fruit and there were only two fruit that were specked in those two boxes, so Mr. Painter made quite a point of it in the Agriculturist, and it was copied into the Times-Union and into other papers throughout the state. There was some article referring to this particular incident in the Agriculturist about that time.

A few minutes ago I handed you a little clipping. This was published by Mr. Powers, who was then editor of the Times-Union, from some returns that he had seen of mine. I don't remember just what the circumstances were, but, then, I have hundreds of just such things. I can't make out what the year is. The day is the fifth of the second month, 1910, then, I should say. That is the "Fruitman's Guide," I think. No, I will tell you—wait a moment. Isn't that the "Fruitman's Guide?" Why, that is a New York paper! I thought it was in the Times-Union. I would read it "Fruitman's Guide, New York." I will allow Mr. Kennelly, the reporter, to copy that into the record. I just slipped that into my purse and it has been there ever since, but, then, I have got any amount of such material as that. The clipping reads:

"No signs of the 'Heart Bowed Down' about the gentleman who is getting these sky-high prices for the oranges he is shipping from Hawks Park, Fla.

There is no trouble about getting all the evidence you [fol. 663] want as to the quality of my fruit from the experiment station, Agriculture Department, Agricultural College, or Agricultural Department; they know me well. Another thing that has connected me with these people, and

more especially entomologists, is that I kept bees here for years. I was, really, the first scientific bee-keeper here, and I learned my science right here, through reading everything in English, but what called me especially to their attention finally was that I beat the record of the United States in production of honey. From 116 colonies I got 41,000 pounds, which filled 101 barrels—forty-gallon barrels, which is a good deal of honey and, you see, the high-priest bee-keeper came down from Medina, Ohio, to see me and talk it over, and made notes and they praised it, and then the Agricultural Department took it from his bee-keeper, and they bother me still by sending bee-keepers to me, although I sold out in 1912 and quit the bee business.

I have been absent from three meetings of the Florida Horticultural Society, in all the thirty-six or thirty-eight years that it has been running. One of these I was held as a witness in a murder trial. I was foreman of the coroner's jury, and another I was in Egypt at the time, and the third time when they had it down at Palm Beach a few years ago, I was taken sick and had to go to the hospital the very day the meeting commenced. I will say the first meeting when they organized I did not attend. That makes four meetings, but I was at the second.

Everything connected with citrus culture more so than any other branch of horticulture or agriculture was thoroughly threshed out at those meetings and in those early days we had discussion a great deal more than we do now, and, to me, that was the most valuable part. Now we have papers from scientists that are fine, and keep us up to date on the scientific side, but I miss the discussions that bring [fol. 664] out the points of the practical grower, you know. There was a thoroughly free interchange of opinion and experience at such meetings. You could not go into any scientific body and find out any more than at our horticultural conventions.

Q. Did you ever hear anybody mention, at those meetings, that borax had been used to treat citrus fruit?

Mr. Morton: We object to that as leading.

Oh, I think, without doubt, I have heard borax mentioned incidentally as part of the washing fluid, or one element, but the idea never got into my head, at any time, that it was used as a preservative, until within a very few years, and

when I heard of that it was so interesting to me that I—just before that I had got some circulars from the Burnham Chemical Company, out in Searles Lake, you know, on the desert, and I took interest enough in that so as to write them that there was a place for them to look for one of the uses for their borax.

I do not believe that stem-end rot had appeared here when Mr. Niles was here, as I remember it. I could not fix that only by referring to my Horticultural Convention Reports. If it was discussed when it came into notice you are sure to find reference to it there, but it is very hard to fix a date of anything like that, you know.

When Mr. Connor came to me for advice regarding the operation of his packing house, with the result that I had Mr. Ballentyne there temporarily to run it for him, he was so dissatisfied with the way things had been going at his packing house that he was seriously worried over it and had come to me several times about it, that is, two or three times, and that action was on account of his worriment over the work not being satisfactory to him. I got Mr. Connor into the Florida Citrus Exchange after he refused to come [fol. 665] in and had stayed out for some years. I got a set of resolutions from the orange growers of Florida. When I sold out I resigned as director of the Exchange, and this set of resolutions—I don't know whether there is a copy of it right there or not, but I will see. It is beautifully engraved, you know, a great nice set. Oh, yes, there it is (presenting document).

Mr. Morton: I object to that as immaterial to anything here, but you may use it if you wish.

Mr. Steward: The resolution reads as follows:

"Tampa, Florida, June 7, 1912.

"Florida Citrus Exchange to Mr. W. S. Hart, Hawks Park, Florida, Greeting:

"We, the entire membership of the Florida Citrus Exchange, having learned with deepest regret on this day, when in annual meeting assembled, that you have ceased, for the time being, to be eligible as an active member of the Florida Citrus Exchange, do extend to you, one of the originators and founders of the Florida Citrus Exchange, our greeting, and hereby express to you on behalf of the citrus

growers of the State of Florida, our hearty thanks and high appreciation for the much that you have done for the industry and for them; and our wish is for a long, prosperous, happy life for you, with the assurance that if you find yourself again a citrus grower in the State of Florida we will welcome you back with open arms and thanksgiving to our ranks as counsellor, benefactor and friend.

Florida Citrus Exchange, per Wm. C. Richardson,
W. C. Temple, W. B. Gray, Committee."

That is just a photograph of the set, you know. The set is as big as this book, that is, the original. I sold my [fol. 666] grove and I forgot I was interested in other groves around through the state, and so I resigned, you know. You are not eligible to membership unless you own some orange grove, some trees, you know, and so I resigned and went off for a winter trip, but later when I got into it again I was taken back into the Exchange, and then when I closed that out they made me an honorary member of the local association, so my name is still on the list.

Now that I have retired, I do not occupy myself in any particular way during the winter.

Oh, I am a director in a lot of concerns. I help to manage some millions of business, you know, as a director. That and my own interests throughout the state, which are scattered all over the state.

I travel part of most every year; I have for the last twenty-four years. I intended to leave this afternoon for a trip around the world, on the "Belgenland," the biggest ship that goes around the world.

Cross-examination:

By Mr. Morton:

There were 450 acres in the Ronnoe Grove property, I think, divided into three different groves, that is the Home Grove and the Osceola Grove; there is, perhaps, a half-mile or a mile between them, and then the Jungle Grove was out in Turnbull hammock. That would be a couple of miles, at least, I should think.

This party of fifty-two went to California just prior to the founding of the Florida Citrus Exchange. We came

right back that year, and at the Horticultural Convention at Daytona we passed resolutions that we should organize the Citrus Exchange. And the organization of the Citrus Exchange followed in a few months after that trip. Just as soon as we could get the necessary changes made in the laws governing those matters.

[fol. 667] That was somewhere near the time of Mr. Chilton's death, but I don't remember whether it was after or not. I rather guess it was. Mr. Ballentyne took his workers over to the Ronnoc Groves after Mr. Chilton's death.

Mr. Niles and I were speaking about it. He thought it was before he, Niles left, but it was after. I looked it up in my old ledger, you know, which tells me when Ballentyne's account was opened, and when it was closed, so I know it was opened in 1902 and closed in 1909. I know positively that it was after Mr. Chilton's death, quite a little time after.

It was only a few months ago that I had this correspondence with the Burnham Chemical Company. It was after they came and spoke to me about it, and I just received the circulars. You know it is a very big work they are starting out there, but it is uncertain yet, so I am not interested in it, especially, but I thought it might be of interest to them to know that it was being used now as a preservative of fruit, and might be quite an item for them.

The Burnham circulars came to me as a prosepectus for the sale of stock, you know. That is how I happened to take it up, because they both came about the same time. They arrived about the time that this new knowledge came to me about the borax, you know. Of course, I had heard about the Brogdex methods, and so forth, probably when they came out; I had read about them in the paper, but I did not know anything about this matter that you speak of before.

I did not send any Brogdex circulars to the Burnham Company. I just wrote them a letter. It was simply that I had been to the State Horticultural Society, and it was mentioned there either by some member to me, or spoken of in the meeting, just about the time that this matter—No, it was just before they came here then, and that is where I got my first knowledge of it as a preservative, but pre-

[fol. 668] vious to that—that is lately, you know—all within the last year.

Q. Well, you have known for a long time, have you not, Mr. Hart, that borax is a well-known food preservative?

Mr. Steward: Objected to as immaterial——

A. Not that it is—What?

Mr. Steward: I merely put in an objection, Mr. Hart. Objected to as immaterial and irrelevant.

The Witness: Shall I answer?

Mr. Morton: Go right ahead.

No, I did not know it, and I was surprised that I did not—if it had been in use. I could not understand how it could have been in use and I reading everything, you know, in relation to citrus culture that is published in English, almost; getting my Bulletins from Washington, and from our Agricultural Department and experiment station, and meeting these others who are interested along that line on every hand. Somehow when I go to a meeting they count me as an "old stager," and all the young men want to talk to me. It is hard to have any time to myself among the old fellows that I most delight in meeting, because they know of me as sort of an experiment station in former years, or have heard of me. I had never heard of borax being used as a preservative for food before that time.

I had heard of other chemicals being experimented with at different times, but I cannot positively name any of those chemicals. I don't know absolutely of my own knowledge whether they used anything in the water at the Connor groves. I think that if they were using anything like that, Mr. Connor or Mr. Chilton would probably have told me.

[fol. 669] My fruit has always carried well until the stem-end rot, and later the blossom-end rot came in, you know, but the blossom-end rot seems to have disappeared. That was a nasty thing, and the stem-end rot was worse, because it affected more fruit. Up to that time my fruit carried very well, indeed. I never had any particular trouble with blue mold. Oh, of course, the fruit that was injured, and the culls showed blue mold, but you have got to abrase the skin to get blue mold into it. There are, really, four conditions that cause blue mold, and all of those four conditions have got to be present or else blue mold doesn't show

up. That is warmth, moisture, the germ and the abrasion of the skin so that the germ can get into it, but the germs are always around, so that we only name the other three. The germ is ever present.

That box of fruit of mine that kept over two months—that was written up in the papers—was not treated with anything. It was just the regular commercial shipment, my Fancy Grade, and that grade was almost absolutely perfect. I did not have any trouble with decay of that at all. What I mean is perfect in appearance, perfect in state, and perfect in color, as near a perfect fruit as I can make a grade of. Then I had No. 1 Bright and No. 2 Bright; those were my three grades.

I continued to use that old Warner washer up to the time that I sold it out. I had two cylinders so that I could change without holding up my business, you know, when the lining wore out, when I would slip the other one in, and I kept the lining always in the other one. I think one of the cylinders is in the concrete house that I built right near my packing house. It is right down here fronting on the road and you can see it from the road, right back up in there. I think it is in there now. The tank was torn down. They tore the tank to pieces here a few years ago, and then [fol. 670] tore down the packing house. It was the same kind of washer as Mr. Connor used.

I know that preservation by chemical treatment was discussed several times in different conventions, but I cannot give you the date of them. You would have to refer to the reports themselves, which you can get from Professor Bly. Any of the officers of the Citrus Exchange have sets, and the chamber of commerce in Jacksonville, the state chamber of commerce has a set, and I have a set here. I cannot remember the chemicals that we discussed now, but I remember that the fault with them was that they had a chemical action upon the linings of the tanks, and for that reason, and the failure to bring the results that were hoped for, they were all abandoned. Those tanks are metal-lined with galvanized iron.

Q. You said you had heard of the use of borax for washing?

A. Oh, I know that borax is a chemical that is often used for cleansing purposes.

Q. Well, I meant for washing citrus fruit. Had you ever heard of it being used for washing citrus fruit?

A. I don't remember about that, whether I had or not.

Q. You knew Mr. Connor quite well, too, did you not, Mr. Hart?

A. Yes I was intimately acquainted with him.

Q. This is the letter you got from Mr. Connor, is it not, Mr. Hart (handing letter to the witness)?

A. Yes, that is his signature, I recognize that. Yes, sir, that is the letter.

Mr. Steward: May I see it, please, Mr. Morton?

Mr. Morton: I will just ask the notary to read it into the record, or I will read the letter:

[fol. 671] "31 Nassua Street, N. Y., Oct. 11th, 1926. Mr. W. S. Hart, Edgewater, Florida. Dear Mr. Hart: Mr. Chilton did use borax in the water in washing his oranges. Very truly yours, Washington E. Connor."

The Witness: That is the only short letter I ever got from him.

By Mr. Morton:

Q. How long a letter did you write him when you made that inquiry, Mr. Hart?

Oh, I suppose a page; it was not all in relation to that, though. I think I must have known Mr. Connor at least 45 years. I have known him ever since he was interested in citrus fruit culture, and it seems that it must have been 45 years. It was not so very long after I came. It may be 40 years, you know; I cannot say positively. I did not know him in New York. He came here first as a winter tourist, and then he got a foreman, Ed. King, and perhaps King stimulated his interest in citrus culture, and finally he bought that property and began to set out groves, and King was his foreman. That was away back in the early days, you know. That was before Mr. Chilton's time. I feel very sure that Mr. Connor never mentioned borax to me as a possible help against blue mold decay, at any time in that period. I was interested in anything that

meant decay to the fruit, the weakness of the fruit, you know. The fruit, when I came here, had the reputation of being very tender; Indian River fruit, it was. This is all classed as Indian River fruit that went out this inlet here from Ormond down to Rockledge, and it had the reputation of being very tender and very subject to decay, so everything that was liable to affect it, one way or the other, was of interest to me. I had very little trouble from decay in my own fruit. It was, oh, as I remember it, some winters, some season's shipments, decay would never be mentioned [fol. 672] in connection with my fruit. You see if there is just a small per cent.—it doesn't take very much of a per cent. to make a reduction on fruit because of decay, but that is an experience almost unknown to me. Not entirely so, because, under some conditions, you know, it would happen that something would go wrong, so that I have, in my life, had perhaps two or three complaints of that kind, but I have been wonderfully free from that up to the time that the stem-end rot came in. That is a different thing entirely from the blue mold, but I should say that borax must affect it because I understand the insurance companies are ready to insure fruit for 18 days that goes through certain processes. I think that borax is used as a preventative of decay for many germ diseases, as I understand it. I never used it myself. I never had any borax, not in contact with my fruit that I know of, in any way.

I cannot say who succeeded Mr. Chilton, when he died, as superintendent for Mr. Connor. My memory is not good enough for that; that is, who succeeded him immediately. I cannot say. I think it was somebody besides these men I have already mentioned.

I cannot positively say whether or not they used any soap, or washing powder, at the Ronnoc Grove packing house for washing fruit, but it is my impression that they did try it. Tried it when I tried it on mine. And gave it up, like I did, as not much good. I think I remember talking that matter over with Mr. Chilton, and we decided that we got as good results from clear water and discarded the soap. I was not at any time in California at the same time Mr. Chilton was there.

The Ronnoc Groves did not keep up as well after Mr. Chilton died as they had before. I think when Mr. Kroon

and Mr. Niles were there it was kept up in good shape, but since then, and between then and the time that these [fol. 673] two men came in, I think in deteriorated more or less, and since they went out—Kroon went out, and Niles—it has gone to pieces. It has been under Mr. Connor's son, Wayne Connor's management for some years, and in 1917 came the hard freeze, you know, and he just dug up a lot of trees, or had them pulled up, and never has given very much attention to them since, as I understand it; only small patches here and there, perhaps, but not as a whole grove. It is nothing like the property was at that time.

I am not sure that I was ever inside of the Jungle Packing House. I have been to the grove since it was built, but I don't remember that I went inside. That was built quite a little time after the one at the grove nearer town. I cannot tell you how long ago the original old Home Grove packing house was built, but it was a good, long time ago. Let's see—well, sometime in the eighties, I am quite sure.

I think we were in Southern California on that trip about two weeks, and in the meantime our private train went down to Texas; then came back up to San Francisco, and we went up there and met up there and stopped a few days in San Francisco, but I think we were in the orange section of Southern California about two weeks.

Dr. Powell was appointed as a committee to take us around and show us what they had of interest, you know. Of course a lot of others went with us, and they furnished carriages, because they were not using autos at that time, much, and they had oiled their roads, and they gave us that brush that is on there (indicating), each one of us, gave us a brush to brush the dust off of us it was so dusty in the road. It is not dusty now, it is all concrete.

Dr. Powell was in the Government service at that time, connected with the Agricultural Department, stationed in California and studying the effects of transportation on [fol. 674] the fruit, and later he became an employee there, and a leading official in citrus circles, hired by the State of California, or if not it was by one of the leading organizations there. I think the Exchange got him out there and gave him a ten-thousand-dollar salary, but I think before he had been there so very long he got into the State employ, along the same line, you know; not that there was any

break-up between him and the Exchange, or anything of that kind, but, as I remember it, the State, at any rate, had an interest in his employment.

Mr. Niles was here three or four years. I did know at the time where he came from; I think he came from the West somewhere out there but I am not sure where. I do not think he had any experience with citrus fruit when I got hold of him. He was well educated, you know, and came down here to start in a new line, I think, was interested in horticulture and he became quite skillful at it. He was a good manager, I think. He did not come here before Mr. Chilton died. He came after Mr. Chilton died, sometime afterwards.

The convention at Eustis was pretty well attended. Just for a rough guess I should say something like 450 or 500. Our membership has run up to something like 2000, you know, but at that time it had not got up to that and, of course, every member doesn't attend, so I would think 450 or 500 would be a fair estimate of them; possibly less. It was our annual, the annual convention of the Florida State Horticultural Society. We have an annual convention in April and May, every year. This is the report of one of the conventions (exhibiting report of the annual convention).

That was after the Citrus Exchange was organized, because this grove was one of the local association packing houses, this packing house. It was one of the Exchange packing houses. We have the Exchange with headquarters [fol. 675] at Tampa, and sub-exchanges, and then several locals that their headquarters are the sub-exchange, you know, and the headquarters of the sub-exchange are Tampa, the head exchange. The Exchange has annual conventions like the Horticultural Society. No, not as the Horticultural Society. The Horticultural Society has its regular annual convention. They (the Exchange) have directors' meetings, and then they call meetings, call in all the directors for a conference, you know, for a meeting or they have a meeting for every orange grower that will come. They do not have any big convention at a regular time, I do not think. You see, seasons vary; sometimes the orange season runs late, and they can't get ready, can't get the year's business closed up always on a definite date, so they vary their meetings more or less on that account.

The Horticultural Convention at Eustis was very late in April or early in May. Probably we held it early that time because they were still packing fruit, you know, then, and that is late; May would be late for packing anything except Hart's Late Orange, or the Valencia, which is the same fruit. I know that they were still packing fruit at the Eustis house at the time of this convention. I remember it distinctly; no question about my memory on that matter.

Mission City, New Smyrna, Florida,
Wednesday, December 15, 1926—2.15 p. m.

(Pursuant to adjournment the further taking of the within depositions was resumed. There were present, on behalf of Plaintiff, Brogdex Company, R. F. Steward, Esquire, and M. C. Massie, Esquire Counsel and E. M. Brogden Esquire of Plaintiff; on behalf of American Fruit Growers Incorporated, W. B. Morton, Esquire, of Messrs. Pennie Davis, Marvin & Edmunds Counsel and Charles R. Pilkington Esquire, of Defendant.)

[fol. 676] MRS. LAURA CREWS

MRS. LAURA CREWS, of Glencoe, Florida, called as a witness on behalf of the Plaintiff, being first duly sworn, testified as follows:

Direct examination:

My husband's name is John Crews and my maiden name was McKenzie. I was Laura McKenzie. I have had something to do with the fruit packing business here in Florida, in the Ronnoc Grove. I graded oranges and packed a few, but not many packed, but I graded a good many. The place where I worked they called the Jungle packing house. I could hardly say what kind of fruit it was I graded and packed. They were called the Indian River orange. We had a large bin full of oranges, you know, and just one girl to a bin, and we had a little stick just to pick the scale on the oranges off, and to sort them out, the good ones from the bad ones, and throw the culls into the basket to throw away. Nothing as I know of was done to the fruit before it came to me to be graded. It was supposed to be run

through a washer before we graded it. I couldn't tell you what it was washed with. We were not allowed to go in the washing room where they washed it, but we could see through the windows where the washer was, where the oranges went down on the washer, but we were not allowed to go through there. But I have seen the oranges being washed, looking through the windows. I don't know what was used in the washer. We wasn't in there; you couldn't prove it by me. I guess it was water what they washed in; I imagine that is what they washed in. It looked like water to me. I never did see anything put into the washer except water. I never did see the water put in, but I just supposed they were washed in water.

I don't work there now. I quit working in there the last of 1910, was when I quit working in there. I remember [fol. 677] that date because I was married the first day of January, 1911, and I worked in there the week before I was married, an extra week, and that is why I remember.

Mr. Niles was the foreman in the Jungle packing house when I left there. I worked with him in there a year, and he ran it two years; he ran it a year after I left. I don't remember how long it was before I left that he came here. Mr. Niles was foreman of the packing house.

I heard of a person called "Shady" Manning there at Ronnoc Grove.

Q. Well, when Mr. Niles was there, was "Shady" Manning running the packing house, giving orders to you people there?

Mr. Morton: I object to that as leading.

A. No, sir.

By Mr. Steward:

Q. Do you know whether or not Mr. Niles allowed "Shady" to hang around the packing house?

Mr. Morton: I object to that as improper examination, and as leading; calling for a conclusion of the witness.

A. No, sir, he did not.

Mr. Steward: I did not quite catch your answer, Mrs. Crews.

A. He wouldn't allow him inside.

Cross-examination:

A fellow by the name of Moon was in charge of the house before Mr. Niles came there. Mr. Connor was superintendent of the grove. I am pretty sure that he was. I won't be sure, but I am pretty sure that he was; he was the owner and the superintendent, I think. I knew Mr. Chil- [fol. 678] ton. One Chilton was the pay-boss; his son, Kirby Chilton was the pay-boss. I don't know what the other Chilton was. I can't explain where he came in, or how he came in.

We couldn't see the washer, but could see the oranges when they came down the drain. The oranges came in through the door. They had a drain on the outside for them to drain off with, and then they came to the door and took them in, in boxes, and put them on the bins for the girls to grade them. I never saw the washer. The washer was in the packing house, off in a little room to the side, just a little room built for that. The other corner of the house it did not join that, but was just built extra for the washer.

The oranges were put out in the bins, out from the washer, and then there was men took them in from the drains and put them in the bins where the girls graded them. They put them in there with boxes. They rolled out some way or other. I couldn't tell you how they rolled them out from the washer when they washed them. They just rolled them on out, but I don't know how they did it; they wouldn't allow the girls to go in there. The oranges were dried when they were put on that drain, the drain on the outside of the house. I couldn't say how they got out there.

Mr. "Shady" Manning worked on the outside. He wasn't in charge of the Jungle Grove while Mr. Niles was there. Before Mr. Niles was there Mr. Moon was in charge of it. I can't tell you who was in charge of the grove. I didn't know anything that happened outside of the packing house. I just worked inside, and that is all I know about it. Mr. Moon had charge of the packers before Mr. Niles came. Mr. Niles took Mr. Moon's place on the inside.

[fol. 679] MRS. CARRIE TANNER

MRS. CARRIE TANNER, of Mission City, Florida, called as a witness on behalf of the plaintiff, being first duly sworn, testified as follows:

Direct examination:

I am a sister of Mrs. Laura Crews, who has just testified here. My husband's name is George W. Tanner. I know something about packing fruit. I had experience at the Ronnoc Grove packing house. That packing house had no other name. That is all the name I know about, is just the Ronnoc Grove packing house. The Ronnoc Grove is located right there in Turnbull Hammock, where the packing house is—at least where the packing house was. It was called Jungle Grove, too, that's right. The packing house where I worked in Ronnoc Grove was the only packing house the Ronnoc Grove had.

I just packed oranges at that packing house. I don't know what the different names of the oranges were, but just oranges. I packed, and graded some. We just graded the fruit by taking the scales off, and the black spots that were left on the ranges after they were washed, was all I could say. I never applied anything to polish the orange, like wax; nothing, only just a clean cloth. They only used a cloth on the oranges to wipe the oranges with. There was nothing on the cloth, though. There was no wax or nothing. Nothing was done to the fruit before it came to me to be graded except washing. I saw the fruit washed; I saw it go through the water. It was washed at the packing house, at the Ronnoc Grove packing house. It was right out on the porch, right at the door. When we would not be busy we stood there and watched them wash it, from the door. It was just poured in the washer, went right through the washer and taken out on the other end up on [fol. 680] the dryer. Not a thing was used in the washer to wash the fruit except water. I haven't worked as a fruit packer in five years, I don't guess, now.

Henry Clifton was in charge of the packing house the last time I packed fruit at Ronnoc Grove packing house. I just remember that he was the last foreman that was there when I was working there, and, if I am not badly mistaken—of course I could be mistaken now about his being the last

foreman that was there. I think, though, he was the last foreman there, but I won't say just for sure he was the last foreman there. McCorkle was the man before him. Mr. Niles, I think, was the man in charge before Mr. McCorkle. The name of that packing house where Mr. Niles was in charge at one time before Mr. McCorkle was there was the Ronnoc Grove packing house, the Jungle Grove, or whatever you call it. Some called it Ronnoc Grove and some called it Jungle Grove. The packing house was called the Jungle Grove packing house. It didn't have no name except the Jungle packing house, is all I ever knew. That is all the name I ever heard of it. Mr. Clifton wound up the season there at the Jungle packing house when I quit working there.

I worked a little at the packing house called the Home packing house the last season we worked at the Jungle. We went into the Home packing house after we finished up at the Jungle. I don't remember who I worked under there, at the Home packing house. Mr. Clifton took us in there. He was there at the time we were working, I guess. There was another foreman there, but Mr. Clifton was with us. Mr. Clifton took us from the Jungle to the Home. Mr. Clifton brought the packers over from the Jungle to the Home packing house.

I have heard of a man called "Shady" Manning, that had something to do with the Ronnoc Groves. "Shady" did not have control of the packing house, or was boss there [fol. 681] during the time Mr. Niles, Mr. McCorkle and Mr. Clifton were running it. He had charge of the grove.

Q. Was he allowed to stay around the packing house?

Mr. Morton: I object to that as leading and calling for a conclusion.

Mr. Steward: That is all right. Was he allowed to stay around the packing house?

A. No, sir, he was not. He just came up to the packing house at times; I supose to bring the fruit up. At the time Mr. Clifton brought the packers over from the Jungle house to the Home packing house, "Shady" was still there at Ronnoc.

I don't remember what year it was when I quit packing at Ronnoc Groves. I have packed fruit since I left there; at the Citrus Exchange. I have not done any packing for

some five years, or so. It has been quite a while since I packed any. Of course, I don't exactly remember within five years, but, then, it has been several years, anyway.

Cross-examination:

Q. Where did you get the idea that Mr. Manning was not allowed at the grove?

A. Well, I don't know as I had an idea on it. I just know that he was not there, that is all I can say.

Mr. Steward: What was that question, Mr. Kennelly?

(Question read.)

I object to that question.

A. (Continuing:) He was allowed at the grove, but not at the house, I mean. I mean, I just suppose it was not his place to work; I don't know. I don't know anything about that.

[fol. 682] There didn't anybody suggest to me that he was not allowed at the house. I said he did not stay at the house. I meant that he was mostly in the grove. He was not an inside man, not from the time I remember of his working there. Of course, he might have been foreman of the house before I went there, but then I don't know.

Mr. Niles was not foreman when I went there, there was one man before Mr. Niles, but I don't remember his name. I don't remember who he was. Another man inside of the house.

Testimony of Jeremiah Burns Booth and William K. Turner, witnesses produced, sworn and examined on behalf of the party Brogdex Comapny, December 20, 1926, at Tavares and Emporia, Florida

Present on behalf of Brogdex Company: R. F. Steward, Esq., M. C. Massie, Esq., Counsel.

Present on behalf of American Fruit Growers, Inc.: W. B. Morton, Esq., of Messrs. Pennie, Davis, Marvin & Edmonds, Counsel; Chas. R Pilkington. Esq., Counsel of Defendant.

JEREMIAH BURNS BOOTH

JEREMIAH BURNS BOOTH, of Tavares, Florida, called as a witness on behalf of the plaintiff, being first duly sworn, testified as follows:

Direct examination:

I am sixty-four years old. I am a fruit grower, that is my main occupation now. That is about my only business now, looking after my groves. I have had other connections with the fruit industry in past years. I used to pack [fol. 683] fruit. I packed fruit more or less from, let's see, from 1900 on up to 1919 or 1920. I was packing fruit here in Tavares when I ceased that business in 1919 or 1920. I was manager of Lake Region Packing Association and had been for about ten years. Prior to becoming manager of the Lake Region Packing Association, I had operated a packing house of my own at Altoona, for several years. The packing house building of the Lake Region Packing Association, where I was manager, is not still standing. The association removed that building, or tore it down, and built another one nearby. They have the same association operating here in this town at present. The new building was put up after I ceased to be manager.

I knew a Mr. F. S. Pond. He was foreman of the Lake Region Packing Association at one time. I cannot say just positively, but I think it was the year 1910 and '11; the latter part of the season of 1910 and '11, or 1911 and '12; I am not sure which. The half of two seasons was all that he was connected with the Lake Region Packing Association. He came to us in the middle of one season and worked until about Christmas on the next season.

When I was manager of the Lake Region Packing Association house, the most of our fruit came in by rail—field boxes sent to the groves and then brought in by rail. Some was hauled in by teams and delivered to the packing house. We used about the same method that is used now. The fruit was washed, dried, sized and packed, the same as the present system.

We had a soaking tank and the fruit was dumped into the soaking tank, taken up from that by elevator and carried on through to the dry box and into the sizers. There was no further treatment that I know of. It did not go direct

—of course you might say direct, but then it went by elevator and went to the dry box and from there to the sizers [fol. 684] without any further treatment than washing or brushing. When the fruit was carried up out of the washing tank by an elevator, it was dumped on the brushes that brushed it as it went down, those revolving brushes, and it went the length of those brushes with water spraying on it for cleansing purposes, and was delivered then onto a rack that was built and carried to the dry box and on to the sizer. Once we had what was known as the Skinner washer, and later we had what was known as the Parker washer. Little pipes were suspended above the brushes and the water pressure from the tanks put out more or less water that sprayed over the fruit, sprayed over the brushes all the time, and naturally hit the fruit as it went down. The purpose of applying the water to the fruit, on the brushes, was to cleanse. Washing powders, such as are generally used for the cleansing of anything of that nature were used in the soak tank. I think we used "Octagon" washing powder and "Gold Dust"; most any kind of washing powders that we happened to be able to get.

I was general manager of the business, and I had men under me as foremen of certain work, whose work was delegated to them, and, at times, I didn't know so much about what they were actually doing, other than in a general way. I knew what was being done, and what was being used, in a general way, and I don't think there was anything much done there without my knowledge at the time. That would not be quite so true during Mr. Pond's time there as at most other times, because he was considered a very efficient man, and probably I trusted it to him more than I would to some others, but I don't think there was anything done there—— Gentlemen, this has been a long time; 15 years is quite a long time to recall all the particulars of whatever might have been done or said at that time. Now, this is to the best of my knowledge.

[fol. 685] There was a very accurate and detailed system of keeping track of the supplies required for use in the packing house while I was manager there. Every business is supposed to have a head, and any supplies that we had to buy were, naturally, bought under the direction of the management, and all bills came through the office and were paid by the office. Nothing was supposed to be bought with-

out the authority of the office. A set of books was kept which would show all expenditures, complete in detail, yes, sir, of every item of expense. That would be true of materials such as washing powders and so on that were used there. The set of books I have mentioned would cover the entire period of my management there, including Mr. Pond's foremanship. We had a complete file, when I left there, of everything, a yearly file, all separated and put away at the close of the fiscal year. We had a complete file of everything.

I don't know of any borax having ever been used there at the Lake Region packing house, to my certain knowledge. If it had been used I think the books I have referred to would contain entries regarding the purchase of such material. I know they would at that time. If the records have been preserved, why, they would show anything that we bought, from a box of matches up. Everything was kept in detail, all the records of the business. And those records were intact when I left the management of the house and ceased to be connected with the Lake Region Packing Association.

Cross-examination:

Mr. Allen succeeded Mr. Pond. Louis Allen was taken on as foreman when Mr. Pond left there. I know Mr. J. C. Thompson. He worked there for a number of years when I was manager.

[fol. 686] Representatives of the American Fruit Growers have spoken to me several times about this matter. I think Mr. Skelly was the first one that ever said anything to me about it, the first time he ever mentioned to me about it.

Q. Do you recall that at one of your interviews you told the representative of the American Fruit Growers that Mr. Thompson would probably know more about what was used in the tank than anyone else you can think of?

Mr. Steward: The question is objected to as not naming the person referred to as the representative of the American Fruit Growers and, therefore, indefinite.

Yes, I told him that. I told some of them in an interview. I have made that statement, yes. I remember also,

coming to the office of the American Fruit Growers Incorporated with Mr. Thompson, and hearing him tell Mr. Pilkington and Mr. Morton about his recollection on the subject. I was satisfied at that time that Mr. Thompson was telling what he recollected and believed to be true, what he believed and what he remembers, yes. I have no reason to doubt his word as to what he thought, what he remembered.

In the beginning of the business Mr. George Coward was our bookkeeper; later on Mr. J. E. Pepper was the bookkeeper. I never kept them myself. I don't know just what you would call the system. We had a practical bookkeeper at all times to take charge of the books. I am sure he did his job all right. They were audited every year. We had an auditor go over them. I don't think they kept what is usually called a "petty cash" account. I think I am sure that they did not. Suppose we wanted to buy a bottle of ink for the office, we generally had an account to buy anything we wanted around town here, in a small way, on ac- [fol: 687] count, and the bills were brought to our office and they were settled, probably once a week, or once a month, whenever they wanted to present their bill. We just ordered it from the store like I would for my own use here, and they charged it in the customary manner.

Probably some of the help was sent up, if we wanted washing powders, some of the help was sent up to the store to get so many packages of washing powders, and they brought the bill back to the office and it was charged until the end of the week, or the end of the month, whenever they wanted to present their bill. The bill was turned in there to the bookkeeper, and he kept these bills and paid them by check, and he had a complete record of the transaction whether it was a weekly or monthly bill. That was itemized and was sent there by the merchant, and he was paid by check and entered on his books accordingly, as any other bill. I think that is about as much details as there is to it. The bookkeeper made some entry in the permanent books of the association. I don't think there was anything different in our bookkeeping system than in the ordinary bookkeeping system, in an institution of that kind. We had a practical bookkeeper. Just like you would have in any establishment of that kind where they kept books.

Mr. Allen was general foreman over the house. I was manager of the whole works, and looked after the outside, as well as general supervision inside. Mr. Allen had charge of the house only, seeing after the proper grading and packing of the fruit, and kept his help regulated and saw that it was at work. He had nothing to do outside of the floor work. My job was general manager of the entire business.

Mr. Boyd worked for us at one time. He filled the same position as Allen, after Allen was gone, in succeeding years.

[fol. 688] Thompson was kind of a general man and came there about the time Mr. Pond left. He never was a general foreman, but he was a man that was very efficient and was trusted to do a great deal. He had charge of the machinery, and he was kind of a second foreman under the general—under the main foreman on the floor, I would term him. He kept record of the fruit as it checked into the house, who it belonged to, and placed it; he knew whose fruit was being packed and kept a record of the number of boxes that were received and turned it into the office, and how many boxes were packed out. He checked the most of the fruit into the cars and had sort of general supervision of the help on the floor, under Mr. Allen or Boyd, or whoever happened to be his foreman.

I remember one season when the decay was particularly bad, during the period I was at the Tavares house. I think it was the year Mr. Pond was there. I remember he made particular efforts to combat the decay. We done all in our power to combat it, all that we knew to do. That was a very serious period, and the losses were very considerable, and we done all that we knew to do to try to help the stuff. We had advices from the Citrus Exchange and from experimental men, both from the Government and from the State, as to the careful handling of fruit and to try to avoid any mechanical injuries or damages whatever to the fruit; put gloves on our pickers, graders, packers and everybody that touched the fruit, and such things as that.

I don't know that Pond made any experiments with preservatives of different kinds. In those days, why, there was Government men that made experiments with the picking and careful handling of fruit. For instance, they

came to our house and asked permission to go out into the field where our pickers were at work and carefully pick and bring that fruit to the house themselves and pack it [fol. 689] away and, at the same time, take some of our commercial pack and set it aside in the packing house and leave it for two weeks, and then they would come back and unpack that fruit and note the per cent. of decay and pack it up and leave it for two weeks longer and come back and make another examination and note the per cent. of decay, to see how much more our commercial handling of fruit was decaying more than theirs. Such experiments as that were made, but I don't know of anything further that Pond made, but I do know that we were anxious to prevent blue mold and were doing anything that was recommended to us as seemed probably of possible help along that line. I don't remember any experiments being made by anybody with chemical preservatives at that time. I don't recall somebody suggesting the use of permanganate of potash at that time. I don't recall that it was ever used; it might have been done, but I don't recall it.

I am a member of the Horticultural Society. I don't remember any discussion of the use of chemical preservatives at the meetings of the Horticultural Society. I have attended their meetings at times, and, at times, I was not present some years. I don't remember; I don't recall any discussion at any of the meetings that I have ever attended. I cannot say definitely the first time that I did hear of the use of chemical preservatives for citrus fruit. I probably read something about it in the papers in the last three or four years, or previous to that. I don't know, but in very recent years I have learned of the use of things as preservatives to kill the blue mold, and so forth, blue mold spores.

Q. Do you know Mr. J. Conger, Mr. Booth?

A. Yes, sir, I know him.

Q. Do you remember saying, in the presence of Mr. Conger, to Mr. Pilkington of the American Fruit Growers, that you recalled experiments with chemicals being made, but that you couldn't recall what the chemicals were?

[fol. 690] Mr. Steward: Wait a minute there. Question objected to as indefinite as to time and place.

Mr. Morton: Did you answer the question?

The Witness: No, sir, I didn't answer it. Now, what was the question?

Mr. Morton: Read the question, Mr. Kennelly, please.

(Question read.)

A. I think I made that statement, in this way: We made experiments of various kinds, probably, for different purposes. I know we used chemicals—and I have made that statement—at the time of the citrus cancer scare. We had a tank for dipping field boxes, and we had cars fumigated, and we used chemicals in that way. I don't recall—and don't think—that I ever made the statement that we used chemicals, or that I remembered of using chemicals in our wash water for washing the fruit. Possibly we did. I don't say that we didn't use it, but I don't think that I made the statement, positively, that we did use it.

By Mr. Morton:

Q. The interview I had reference to was held at the American Fruit Growers' office at Orlando, Florida, on or about October 14th; is that your recollection about when and where it was?

A. Yes, that is it.

Mr. Steward: I suggest you give the year, Mr. Morton.

Mr. Morton: 1926. That is all.

Mr. Steward: That will be all, Mr. Booth.

[fol. 691] WILLIAM K. TURNER

WILLIAM K. TURNER, of Emporia, Florida, called as a witness on behalf of the plaintiff, being first duly sworn, testified as follows:

Direct examination:

I am forty-three years old. I am in the citrus business. That is all I have been at.

I was superintendent for the Volusia Company here, and, of course, I look after all this property here, you know.

I don't pack fruit. I have all the picking done, but then, of course, we are not packing it; no, I don't pack at all.

I have been in the fruit-packing business, but it is a long while ago, though, since I have been in the packing business. I couldn't tell you when, like I told you the other day about that. I couldn't tell you, sir. I will tell you, we were in the packing business here and I used to run a packing house out there, just before the Exchange—the year the Exchange organized, when we gave it to the Exchange.

It was Turner and Beers then; Mr. Beers and I were together then. Mr. Beers' initials were J. J. He is dead.

The packing house I operated with Mr. Beers didn't have a name. Really it wasn't any name, as far as that goes, practically. We just operated under our firm name of Turner & Beers. We run that packing house two years before we went over to the Exchange. Mr. Beers' health got so bad he gave it up; he run it for years.

We turned that house over to the Exchange the first year they were organized. I don't remember how many years ago that has been. Probably some of you orange men know more about that than I would. Well, a fellow could look up [fol. 692] the records and find out, you know. I am talking about the Florida Citrus Exchange.

I was living down the road here, at that time, about half a mile from here, I reckon; pretty near a half mile. Mr. Palmer was my neighbor there—George W. Palmer. I lived there ten years, right there by him.

Mr. Beers and I washed our fruit and all that, the same as they do now, only we didn't have the machinery that you have now, of course. We first used to use just tubs, you know; we would have ten or fifteen washtubs, and after that we had a cylinder washing machine. I will say we did not use it all the time, but we have used it—we have used Schnarrs' insecticide for washing the fruit. But we didn't use it all the time, I will say that, but then we have used it you know, when we first got the white fly around here. The oranges were as black as your hat, you know, and you couldn't get the stuff off of them.

We just used a portion of Schnarr's insecticide—I don't know enough just how it goes. We used it like we would spray orange trees. It has been so long ago I don't remember what the proportions was, now. We used to use

it in spraying all the time, you know. We also put it into the wash water for the oranges, too. It makes the water look like milk; kind of white, of course.

I lived as a neighbor of Mr. Palmer there for some ten years or so.

I can tell you just exactly when I moved to that place; that is eighteen years ago I moved to that place, that is, settled on that place there, the first of October. I don't know—my boy's age, my youngest boy—it was eighteen years ago and I lived there about ten years.

I don't know how close that house was to Mr. Palmer's. Not much over one hundred feet apart there, are they? One [fol. 693] hundred and twenty-five, probably; right close to that; I don't know.

I knew Mr. Palmer pretty well when I was living there. I talked with him frequently. Mr. Palmer and me was always good neighbors, right there together, yes. I have seen him washing fruit on his place there, next to where I was living. I have seen him washing them in a tub there a lot of times. I sure don't know, particularly how he washed it. To be fair with you, I don't know how he washed that stuff, only I just seen him washing it in the tubs on the back porch there. If he ever told me what he was using to wash the fruit with I don't remember it. He used water in the tub. I couldn't say whether or not he ever told me that he was using borax in that water; no, I couldn't say that, because I don't remember. Probably he did; I don't say he didn't, but, then, as far as that goes, I don't remember. I don't remember of his ever telling me that he used borax in the water.

Mr. Palmer used to ship a little bit of fruit through the house run by me and Beers. He used to work there. And then, after, he worked for the Exchange, too. He worked for the Exchange, but I don't know just how long. I mean that he was working for the association, the Emporia Association.

The Emporia Association took over that house from me and Mr. Beers, and Mr. Palmer was employed there. I don't know to what extent, or how frequently.

Mr. Palmer used to work for Mr. Beers quite a bit them days, though. Of course he got to where he couldn't you know; he worked where he didn't have to.

After the house was turned over to the Exchange I used to be floor manager there, that is, looked after the packing and things like that, you know. I did it for, oh, I don't know, two or three years after the Exchange taken it, but [fol. 694] I don't remember just how long it was. After those two or three years I discontinued my work as a fruit shipper and packer. I haven't bothered with it since. I never operated independently in any way. During all that time I was a neighbor of Mr. Palmer's.

It was a part of my business to try to get the fruit in the best possible shape to ship, when I was working in the packing business. We didn't think so much about decay. I will tell you the truth, we didn't think so much about it in them days. Of course, if a car went bad without no reason we generally laid it to the weather, or picking it when the dew was on it.

Q. Well, if you had known of anything that would stop decay you would have used it?

Mr. Morton: Just let me put in an objection as leading.

A. Oh, yes, we would.

By Mr. Steward:

Q. Or if anybody told you about it?

A. Yes. Well, if we had known about it, of course.

We used Schnarr's Insecticide to take the soot off the oranges. We wasn't using it to preserve them, or anything like that; just using it for cleaner. I couldn't say whether or not that use of Schnarrs' Insecticide, in washing oranges, was at all common. I told you we used it when we got some oranges—now, I didn't say it was a practical thing, or anything like that—but we used it when we got the oranges so black we couldn't clean them, you know, that is all. We didn't use it all the time. When we felt it was bad is when we used it.

Q. Did the neighbors around here, that is, the people in this community, know you were using Schnarrs' Insecticide there at the packing house?

Mr. Morton: That is objected to as calling for a conclusion, and hearsay.

[fol. 695] A. Well, of course I expect they did; I think they did. Anybody working here knew we was using it.

Mr. Steward: That will be all, I think, Mr. Morton.

The Witness: You needn't put this down, but I think Mr. Palmer will tell you the same thing about the Schnarrs' Insecticide.

[fol. 696] In United States District Court

Stipulation as to Condensed Record—Filed April 27, 1928

And now, to wit, this twenty-fifth day of April, A. D., 1928, it is stipulated by and between counsel for the respective parties to the above-entitled cause, subject to the approval of the court, that the foregoing transcript of the record of proceedings at the trial of said cause, in condensed form, the testimony of witnesses being stated only in narrative form, save that in preparing said record the part of the testimony desired by the respective parties to be reproduced in the exact words of the witnesses has been left in question and answer form, shall be treated and considered as the record of the trial of said cause, in making up the transcript of record on appeal.

It is further stipulated and agreed that either party may refer to the original transcript of the record for correction of errors in the printed record; and

It is further stipulated that all of the original exhibits in this case shall go up physically as a part of the record on appeal in order to supplement the exhibits as printed in the record on appeal.

(Sgd.) Charles Neave, Solicitor for Plaintiff.

(Sgd.) George E. Middleton, Solicitor for Defendant.

In United States District Court

Order Approving Stipulation as to Condensed Record—Filed April 27, 1928

And now, to wit, this twenty-sixth day of April, A. D. 1928, upon reading and considering the foregoing stipulation, it is, upon motion of E. Ennalls Berl, Esq., solicitor for defendant,

[fol. 697] Ordered by the Court that the foregoing condensed statement of the record of proceedings at the trial of said cause, to be incorporated in the transcript of record on appeal, be and hereby is approved.

(Sgd.) Hugh M. Morris, J.

IN UNITED STATES DISTRICT COURT

STIPULATED PRÆCIPE FOR TRANSCRIPT OF RECORD ON APPEAL

It is hereby stipulated and agreed by and between counsel for the respective parties in the above-entitled cause, subject to the approval and direction of the Court, that in the Transcript of Record of this case on appeal to the United States Circuit Court of Appeals for the Third Circuit, the testimony of the witnesses shall be stated only in narrative form, save that those parts of the testimony desired by the respective parties to be reproduced in the exact words of the witnesses be left in question and answer form, and that the clerk in making up said transcript shall incorporate therein the following:

1. The Docket Entries.
2. The pleadings, including:
Bill of Complaint,
Answer,
Amendments to Answer.
3. The evidence, including:
Stipulation as to incorporation, title, printed and photostat copies of patents and publications, claims to be relied upon, etc.
Testimony of witnesses stated in narrative form.
Notice of defendant's taking depositions in Florida.

[fol. 698] Depositions offered in evidence stated in narrative form.

Plaintiff's exhibits
1, 2,
3 (the article entitled "How to Prevent Decay of Our Citrus Fruits" on page 611),
4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21,
22 (the article etitled "Fruit Handling and Pre-Cooling Investigations" on pages 59 to 65 inclusive),

23, 24, 25, 26, 27, 28,
29 (the article entitled "The Rot of Citrus Fruit" on pages 5, 6 and 7),
30, 31, 32, 33, 34, 35, 36,
37 (the article on page 161 through line 5 of page 179),
38 (the article entitled "Crusade Astir to Improve Methods of Fruit Handling" on pages 285-286 including division, entitled "Effects on Market told by Ramsey"),
39,
40 (the article entitled "Need of Care to Prevent Blue Mold Decay in Transit" on pages 170-171),
41, 42 (pages 3, 4 and 5),
43, 44, 45, 46,
47 (the article on page 44 entitled "Preliminary Report of the Effect of Hot Water, Hot and Cold Borax Solution on Scale Insects"),
48, 49, 50,
51 (the article entitled "Borax as a Preventive of Decay" on pages 7 and 8),
52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 82A, 83, 84, 85, 86.

[fol. 699] Title pages shall not be reproduced, but in each instance the name of the journal, book or other publication, together with the title of the article, the author and the date of publication shall clearly appear and where a Government publication this should appear. The following exhibits shall be reproduced photolithographically, or original printed copies used:

2, 4, 6, 8, 10 (pages 6 and 7), 11, 19, 24, 28, 32, 41, 43, 44, 45, 48, 50, 52, 69, 70, 71, 74, 76, 77, 78, 79, 80, 84, 84A.

The other exhibits may be reproduced by printing or original printed copies used.

Plaintiff's Exhibit 87 to be used as a physical exhibit.

Defendant's Exhibits
1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12,
13 (translation),
14,
15 (translation),
16, 17,
18 (translation),
19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45.

Title pages shall not be reproduced, but in each instance the name of the journal, book or other publication, together with the title of the article, the author and the date of publication shall clearly appear and where a government publication this should appear. Exhibit No. 8 shall be reproduced photolithographically, the others may be reproduced by printing, or original printed copies used.

4. Opinion.
5. Interlocutory Decree.
[fol. 700] 6. Assignment of Errors.
7. This stipulation and order of Court thereon.
8. Stipulation as to testimony and order of Court thereon.
9. Clerk's certificate.

(Sgd.) Charles Neave, Solicitor for Plaintiff. (Sgd.) George E. Middleton, Solicitor for Defendant.

IN UNITED STATES DISTRICT COURT

ORDER APPROVING STIPULATION AS TO TRANSCRIPT— Filed December 9, 1927

And now, to wit, this ninth day of December, A. D. 1927, upon motion of E. Ennalls Berl, Esq., solicitor for defendant-appellant,

It is ordered by the Court that the foregoing stipulation be and the same hereby is approved and the clerk is hereby authorized to certify the transcript of record prepared in accordance with the foregoing stipulation and to transmit the same, together with the physical exhibits referred to therein, to the United States Circuit Court of Appeals for the Third Circuit, at Philadelphia, Pennsylvania.

(Sgd.) Hugh M. Morris, J.

[fol. 701] Clerk's certificate to transcript of record omitted in printing.

[fol. 702] IN UNITED STATES CIRCUIT COURT OF APPEALS FOR THE THIRD CIRCUIT, OCTOBER TERM, 1928

No. 3760 (List No. 17)

AMERICAN FRUIT GROWERS, INC., Appellant,

vs.

BROGDEX COMPANY, Appellee

Appeal from the District Court of the United States for the District of Delaware

ORDER DESIGNATING JUDGE—Filed Oct. 5, 1928

And now, to wit, this 5th day of October, A. D., 1928, it is ordered that Hon. William H. Kirkpatrick, District Judge for the Eastern District of Pennsylvania, be, and he is hereby, assigned to sit in above case in order to make a full court.

Victor B. Woolley, Circuit Judge.

[File endorsement omitted.]

[fol. 703] Minute entry of argument and submission October 5, 1928, omitted in printing.

[fol. 704] IN UNITED STATES CIRCUIT COURT OF APPEALS FOR THE THIRD CIRCUIT, OCTOBER TERM, 1928

No. 3760

AMERICAN FRUIT GROWERS, INC., Defendant-Appellant,

v.

BROGDEX COMPANY, Plaintiff-Appellee

Appeal from the District Court of the United States for the District of Delaware

OPINION—Filed October 7, 1929

Before Woolley and Davis, Circuit Judges, and Kirkpatrick, District Judge

DAVIS, Circuit Judge:

This is an appeal from the decree of the District Court holding claims from 1 to 9, 14 to 18 and 23 to 26, inclusive, of United States Letters Patent No. 1,529,461 issued to Ernest M. Brogden and Miles L. Trowbridge, March 10, 1925, and by them assigned to the Brogdex Company, valid and infringed by the defendant, American Fruit Growers, Inc.

Claims 1 to 9 and 14 to 18, inclusive, are process claims and 23 to 26, inclusive, are product claims. The patent is for "Improvements in the Art of Preparing Fresh Fruit for Market." The process claims relate particularly to processes for the treatment of citrus fruits in such manner that the development of molds and the like upon the fruit, and especially the development of blue mold and infection [fol. 705] by blue mold spores is prevented or arrested either wholly, or to such an extent, as greatly to prolong the marketable life of the fruit beyond the period theretofore possible.

The decay is caused by parasitic fungi, penicillium, a genus of the ascomycetous fungi, commonly called "blue mold," whose spores find lodgment and germinate most frequently in the lesions in the skin of citrus fruit. The ravages of blue mold decay result in enormous losses to fruit growers and packers, and for years strenuous efforts

had been made to overcome or reduce blue mold decay and to prevent this loss. These efforts were elaborate and organized and carried on with great care and energy, but the problem remained unsolved until the patent of Brogden and Trowbridge. Up to the time of this patent the teaching of the industry was that the only practical way to prevent blue mold decay was by extremely careful handling, so as to avoid the slightest surface injury, and by refrigeration.

The process of the patent consists in subjecting the fruit to be packed and shipped to an aqueous solution of borax, so as to impregnate the rind or skin of the fruit with the borax and render it resistant to blue mold decay. Claim 3 is typical of the process claims and claim 26 is typical of the product claims:

3. "In the preparation of fresh fruit for market, the process which comprises subjecting fruit to the action of an aqueous solution of borax, the fluidity, strength and temperature of the treating solution, and the duration of the treatment, being such that exposed rind or skin tissues of the fruit are effectively impregnated with borax and rendered resistant to blue mold decay, while at the same time the fruit is not scalded nor is its freshness or edibility otherwise substantially impaired."

In general the process, as stated in the specification, consists in applying to the fruit a mold inhibiting reagent com- [fol. 706] prising the boric acid radical which is alkaline in reaction and renders the surface of the fruit unfavorable as a medium for blue mold development. Compounds of borax appear to have a specific inhibiting action upon blue mold, but is without corrosive or other deteriorating action upon fruit to which it is applied.

The invention is not a mere patent on borax nor on its general unlimited application on fruit. The patentees say that:

"The patent recognizes that under modern commercial harvesting and packing house conditions, surface injury of a substantial proportion of the fruit handled is an absolutely unavoidable incident, and it provides for the application of borax to fruit thus commercially handled but

under such conditions as to ensure impregnation of the exposed rind tissues with an amount of borax adequate to inhibit mold growth and to prevent spore development; and to leave in these tissues and on the surface of the fruit generally such a residue of borax as will render the fruit effectively resistant to blue mold decay."

As a practical matter it is hardly feasible commercially to gather large quantities of fruit rapidly and economically without a substantial percentage of the fruit being scratched, cut, pricked, or otherwise mechanically injured, notwithstanding the highest degree of care that can be exercised in commercial practice. The slightest surface scratch or abrasion even so minute as to be undiscernable to the naked eye furnishes a foothold to blue mold spores which in the practice heretofore followed are unavoidably present everywhere in packing houses, on machinery, in wash water and floating in the air, ready to infect all fruit having the slightest bruise, scratch or abrasion. As a result, often the decay and loss from blue mold is as high as 30 [fol. 707] to 40 per cent. The processes of this patent satisfactorily demonstrate that blue mold decay can be arrested, the fruit rendered immune to attack by blue mold spores and its marketable life extended far beyond that of untreated fruit, without affecting the freshness and flavor of the fruit.

The method of applying the inhibiting solution to the fruit may vary, the precise details of procedure not being essential to the invention in its broader aspects, but generally borax is added directly to the wash water in the usual soaking tank into which the fruit is dumped from the field boxes as it comes from the grove. The exposed tissues become impregnated with the reagent and render them immune to attack. It has been found that the solution acts best when it is about 115 degrees to 120 degrees Fahrenheit. The strength of the solution may vary but generally experience shows that the solution should be, at least, about 5 per cent. by weight or about six or seven ounces of borax to a gallon of water. The invention deals with a problem peculiar to commercial large scale methods of handling fresh fruit.

Claim 26 is typical of the product claims and is as follows:

"26. Fresh citrus fruit of which the rind or skin carries borax in amount that is very small but sufficient to render the fruit resistant to blue mold decay."

The product claims define an article of manufacture, since the fruit is the result of a process which is defined and described and not a natural product. The product is a combination of the natural fruit and a boric compound carried by the rind or skin in an amount sufficient to render the fruit resistant to decay. The complete article is not found in nature and is thus an article of manufacture. Riter-Conley Mfg. Co. v. Aiken et al., 203 Fed. 699.

[fol. 708] Infringement is admitted, if the patent is valid, and the sole question, therefore is validity.

There is no question about the need of some kind of inhibiting agent to prevent blue mold decay nor about the search of the industry for it. From 1902 to the invention in 1923 the entire industry engaged in growing, packing and selling citrus fruit, departments of agriculture of states and the federal government, together with such eminent horticulturists and pomologists as Powell, Hart, Tenny, Woodworth, Dyer, Faweett, McKay, Skinner, Sadler, Ramsey Mann, Holton, Stubenrauch and others were earnestly and laboriously in a concerted and continuous effort studying the problem of finding something to prevent blue mold decay. Concentrated study and continuous cooperation among growers, packers, dealers and scientific men who investigated the subject resulted in the conclusion that the only way to stop or minimize blue mold decay was to prevent injury to the fruit by careful handling and by refrigeration. The opinion was practically unanimous that chemical treatment was not helpful but harmful.

The application for the patent was filed August 13, 1923, and soon thereafter, in the early part of 1924, the agricultural department experts of California and Florida began to issue bulletins, contrary to their former teaching, about the new and effective way of stopping blue mold by the use of borax solution. While with careful handling, the losses ran as high as 30 to 40 per cent., under the processes of the patent conducted by the California Fruit Growers Association at its packing house in California, out of eighty-six car shipments only in three cars did the losses exceed 3 per cent. The borax treatment applied to very ripe fruit by

Dezell, General Manager of the California Fruit Growers Exchange, resulted in reducing the blue mold decay more than two-thirds. This saving is considerable when it is recalled that from California alone as far back as 1905, [fol. 709] 10,000,000 boxes of citrus fruit, valued at $27,000,000, were shipped yearly.

On October 17, 1924, about fourteen months after the patent was applied for and for months after Dezell sent his letter addressed "To all Shippers" telling them of the wonderful results obtained by the borax treatment, the Florida Citrus Exchange sent out a bulletin "To all Sub-Exchange and Association Managers" telling them that their experiments showing that by dipping citrus fruits in a 5 per cent. borax solution at a temperature between 115 and 120 degrees F. for a period of five minutes 90 per cent. of the blue mold rot was prevented under conditions favorable to its development. He said, "This advance announcement is made so that Florida shippers may consider the question of trying out the treatment early in the shipping season * * * It is requested that the matter be kept from the press for the present, until publication can be made of the evidence on which the conclusions are based."

All the literature sent out in 1924 by the various citrus Exchanges and Associations shows that the borax treatment was something new and a distinct departure from any treatment known and followed theretofore, and was remarkably effective in preventing blue mold decay. At the same time government publications and trade journals were taking up the discussion of the borax treatment as a new treatment.

All this shows that the citrus-growing world had found in this patent what it had been earnestly and unitedly searching for during a quarter of a century. Fulton of the Bureau of Plant Industry at its annual meeting held at Eustis, Florida, on April 7, 8 and 9, 1925, in speaking of the borax treatment said: "For a long time fruitless search has been made for a satisfactory chemical agent that will control these (blue mold and stem) rots" and this agent was found in the borax treatment.

[fol. 710] The defendant contends that there was no long and unsuccessful search for an inhibiting reagent to prevent or control blue mold decay and that the use of borax was apparent to scientific men skilled in the art of food

preservation and cites the experiments in the Department of Agriculture of Dr. H. C. Gore in collaboration with Dr. W. M. Scott. True, they did make some experiments on oranges in December 1904 and January 1905 which showed that borax retarded the progress of blue mold decay on citrus fruit when applied to mechanical injuries, but nothing ever came of the knowledge that they obtained from the experiments or otherwise. They never made it public. The defendant says that the "experiment was nipped in the bud by Dr. Powell for reasons which were quite cogent in those days of pure-food campaigns". Dr. Gore said: "I reported the results of this experiment to Dr. Powell, and I believe also to Dr. W. A. Taylor. I remember that Dr. Powell noticed the presence of a few crystals of boric acid on the surface of the oranges, and just at that time I might say there was a great deal of agitation against the use of any chemicals in connection with foodstuffs on account of the agitation in connection with the Pure Food Law which was passed a couple of years later, and Dr. Powell did not like the idea of anything suggesting that chemicals had been used appearing on a wrapper or on an orange and he deprecated the idea of using boric acid for that reason."

As we interpret the language of Dr. Gore, it was an inference on his part that Dr. Powell did not adopt and follow out this experiment because of the agitation in connection with the Pure Food Law which did not come into existence for two years. Dr. Powell, and others working with him, did, as a matter of fact, use and experiment with chemicals until they reached the conclusion that they were ineffective and could not be used as inhibitive reagents on [fol. 711] citrus fruit because they had the idea that the spores must be destroyed and any chemicals strong enough to kill them would injure the fruit or were too expensive. Strong toxic chemicals of positive fungicidal action, such as copper sulphate, ammoniacal copper carbonate, bichloride of mercury and the like were used for killing the spores. The idea of killing spores instead of inhibiting them led directly away from anything like borax treatment. Dr. Powell never once even hinted to the trade that borax or any chemical could not be used for any such reason as given by Dr. Gore or the defendant, but with other pomol-

ogists and horticulturists in general thought that spores had to be destroyed by means of strong chemicals.

The patentees proceeded upon a different theory. It was their idea not to destroy spores, but by means of antiseptic borax solution seal the broken places in the citrus rind that had been punctured and thus close to the spores avenues through which they entered the fruit. The borax solution thus inhibits rather than kills the spores.

This new treatment of citrus fruit was adopted by the industry after elaborate tests by experts and citrus fruit organizations, which is strong evidence of invention. Westinghouse Air-Brake Co. v. New York Air-Brake Co., 59 Fed. 581, 593.

There was doubtless prior use of borax as a preservative, but the record fairly interpreted, as the learned district judge found, clearly shows that there was no prior use of it as an inhibiting reagent for blue mold decay. We have an old and well-known substance applied in a new and useful way and this constitutes invention. The activity of and investigations conducted by the citrus growers, packers and shippers, scientific men and the departments of agriculture, federal and state, to find some reagent to control [fol. 712] blue mold decay are inexplicable on any other theory. The burden of proof rests upon the defendant to establish prior use and every doubt should be resolved against him. Oral testimony of prior use is generally unsatisfactory because of the forgetfulness of witnesses, their liability to mistakes and their proneness to recollect things favorable to the party calling them. Consequently courts have imposed upon defendants the burden of proving prior use beyond a reasonable doubt. Coffin v. Ogden, 85 U. S. 120; The Barbed Wire Patent, 143 U. S. 275; Eibel Process Company v. Minnesota and Ontario Paper Company 261 U. S. 45. The defendant's testimony does not sustain the burden imposed upon it. What the patentee did was, not to discover that borax was a good antiseptic and preservative, but to discover that borax was a good inhibiting reagent for controlling blue mold decay on fresh citrus fruit when applied as the patent directs. As the court below said: "Their invention, as I understand it, is not the mere use of borax or boric acid, nor of the use of that force in a specific manner, but it consists in the subjection of a specific

object to the influence of a specific force acting through a specific mode of application to produce a specific result. Robinson on Patents. Sections 261-263. Such process is nowhere found in the disclosures of the prior art."

We think that the disclosures of the patent are new and useful and constitute invention and that the patent for this process and product is valid.

The decree of the district court is affirmed.

A true copy. Teste:

——— ———, Clerk of the United States Circuit Court of Appeals for the Third Circuit.

[fol. 713] IN UNITED STATES CIRCUIT COURT OF APPEALS FOR THE THIRD CIRCUIT, OCTOBER TERM, 19-8

No. 3760 (List No. 17)

AMERICAN FRUIT GROWERS, INC., Appellant,

vs.

BROGDEX COMPANY, Appellee,

DECREE—Filed Oct. 7, 1929

Appeal from the District Court of the United States for the District of Delaware

This cause came on to be heard on the transcript of record from the District Court of the United States for the District of Delaware and was argued by counsel.

On consideration whereof, it is now here ordered, adjudged, and decreed by this Court that the decree of the said District Court in this cause be, and the same is hereby, affirmed, with costs.

Philadelphia, October 7, 1929.

J. Warren Davis, Circuit Judge.

[File endorsement omitted.]

[fol. 714] [File endorsement omitted.]

[fol. 715] IN UNITED STATES CIRCUIT COURT OF APPEALS

[Title omitted]

PETITION FOR REHEARING—Filed Nov. 6, 1929

The Honorable, the Judges of the United States Circuit Court of Appeals for the United States:

Your petitioner, American Fruit Growers, Inc., defendant-appellant in the above-entitled cause, respectfully prays for a rehearing of the appeal herein on the ground that the opinion handed down October 7, 1929, contains plain error as more specifically pointed out below.

The Court at the end of its opinion epitomizes the patentee's invention in the following language:

"What the patentee did was, not to discover that borax was a good antiseptic and preservative, but to discover that borax was a good *inhibiting* reagent for controlling blue mold decay on fresh citrus fruit when applied as the patent directs." (Italics ours.)

[fol. 716] This finding is not supported by the evidence. Prior to the application date of the patent in suit "blue mold" had been carefully studied by the mycologysts and its characteristics set out in scientific detail. The effect of borax and boric acid on the growth and development of the mold had been determined by scientific experiments and accurately defined—not only by general statements that the growth was "inhibited"—but by detailed statements of the behavior of the spores as observed under the microscope.

The Bitting article of 1909 (Deft.'s Ex. 14, Vol. II, pp. 969-976) states:

"The preservatives are those which have been used in foods, and used in approximately the same amounts. The results show that they have a retarding effect on the development of the mould, even when in small amounts, and that most of them become *inhibitive* when the amounts are increased, the increase not exceeding the amounts which have been used in foods." (Emphasis ours.)

The tabulated results show that with both borax and boric acid of a strength of ½% the growth was completely in-

hibited for forty-eight hours and at the end of seventy-two hours there was only slight growth in the culture containing the boric acid. The results are summarized in the following statement (p. 976):

"The germination and subsequent development indicate that the preservative affected the conidia deleteriously, as some were retarded, while the conidia from the solutions showing the strongest effects on the previous development, did not germinate, except from the ½% boric acid solution which formed a few submerged colonies, no surface development taking place."

Defendant's Exhibit 15 (Vol. II, pp. 977 et seq.) is an article by Boeseken and Waterman published in 1912 deal-
[fol. 717] ing specifically with the effect "of boric acid and several other compounds upon the development of Penicillium Glaucum [blue mold] and Aspergillus Niger [another fungus]." This article states:

"In several previous communications we have shown that the *inhibiting* effect of numerous organic compounds upon the development of Penicillium glaucum runs parallel with their solubility in fat, in so far as they are also somewhat soluble in water."

. . . . . .

"Boric acid is practically insoluble in olive oil—a fact of which we have convinced ouselves by an experiment—and yet its *inhibiting* effect upon the development of Penicillium glaucum is in several cases surprisingly great."

. . . . . .

"Some day it will perhaps be possible to detect such a direct chemical compound between boric acid or other inorganic compounds and one or several constituents of the protoplasm. Just if one takes a chemical linkage as the basis of the effect of boric acid it is easily conceivable why the *inhibiting* effect will be such a specific one. Thus Aspergillus niger, Table II) is far more resistant with respect to boric acid than Penicillium glaucum."

. . . . . .

"It is accordingly more probable that the cause of the toxic effect of this and many other metal salts, like that of boric acid, is not a purely physical one, but also and primarily a chemical one; these are exactly the elements which are most capable of forming complex compounds. That in the *inhibiting* effect which several inorganic compounds exert upon the development of Penicillium glaucum their chemical combining power will be determinative, we accordingly regard as very probable."

. . . . . .

[fol. 718] "Summary

A. We ascertained: I. That boric acid, even in extremely low concentration (+0.06 per cent), has a distinctly *inhibiting* effect upon the development of Penicillium glaucum, and that this deleterious concentration is much higher in the case of Aspergillus (0.5 to 1 per cent)." (Emphasis ours.)

The use of borax as a practical agent for combatting decay was known and patented long before the action of the borax on the mold was studied under the microscope. The prior patents relied on by the defendant do not use the word "inhibiting" when discussing the preservative action of borax but do fully disclose its practical use.

Consider for a moment only three of these patents—Gahn (U. S. Patent, No. 161,944, October 14, 1874), Bishop (U. S. Patent, No. 683,899, October 8, 1901) and Storer (British Patent, No. 214 of 1888).

Gahn states:

"This invention relates to a new composition by which all kinds of raw food, fruit, and other vegetable products may be preserved for a longer time, and in warm climate; and the invention consists in compounding boracic acid and alum in the proportion of about twenty parts of boracic acid and ten parts of alum.

This composition may be used in a powdered state, and then rubbed and sprinkled over layers of the substance to be preserved, or in a liquid state, and then the substances to be preserved have to be dipped or immersed into the liquid. For this solution I prefer to use from eight to ten

ounces of the powder to one gallon of water, or as much as the water will dissolve. Sugar in the proportion of about two parts to ten parts of alum and twenty of boracic acid may be also used to advantage, in addition to the ingredients named, and the proportion of the alum may be varied according to the amount of substances to be pre- [fol. 719] served, some kinds requiring but one part of alum to twenty of boracic acid, and some as much as ten parts of alum to twenty of boracic acid."

Bishop states:

"This invention aims to prolong the period of usefulness of fruit, vegetables, eggs and the like as articles of food and prevent their usual rapid decay and deterioration, thereby benefitting the grower, the shipper, the merchant, and the consumer.

"The invention consists in subjecting the article of food to an antiseptic bath to purify, cleanse, and kill all germ, then treating it to a coat of air-excluding material. This process not only preserves the article of food, but enhances its value.

"The article of food to be treated is first washed or bathed in a comparatively weak solution of boracic acid, which destroys any and all germs and thoroughly cleanses and renders the article wholesome. The article is then coated with gelatin, which excludes the air and prevents the entrance of atmospheric germs, thereby preventing decay. * * * The boracic acid solution is prepared by adding two ounces of commercial boracic acid to one gallon of pure filtered water."

Storer states:

"My invention has for its object the preparation of packing material for the preservation in a cheap and convenient manner of all kinds of fresh fruits for the storing and for the transport thereof to near or distant markets; and the prevention for a reasonable time of decay or damage therein."

In making this packing material he takes sawdust, chaff, etc., and impregnates it with a solution of boracic acid or borax, drys the impregnated material and then packs his

fruit therein. Among the fresh fruits specifically mentioned by Storer as subject to his treatment are oranges, lemons and limes—all citrus fruit.

[fol. 720] If borax inhibits blue mold decay when applied as Brogden and Trowbridge direct, it just as surely inhibited that decay when applied as Gahn and Bishop and Storer directed. The Gahn and Bishop and Storer patents were taken out before the work of Bitting, Boeseken and Waterman. Probably the patentees had never heard of "inhibiting" decay. They spoke of "preserving fruit for a longer time," "preventing usual rapid decay," "preservation—of all kinds of fresh fruits for the storing and for the transport thereof." Their language was simpler, less sophisticated. But borax was not simpler nor less sophisticated. It was the same old borax; and if it inhibits today it inhibited then, and all that Brogden and Trowbridge did was to choose the more modern language of Bitting, Boeseken and Waterman to explain an ancient phenomenon.

Invention is not a matter of mere words, and patents should not be granted to those who only explain how old things operate, particularly when that explanation has already been published by others.

The Court's opinion also states:

"The patentees proceeded upon a different theory. It was their idea, not to destroy spores, but by means of antiseptic borax solution seal the broken places in the citrus rind that had been punctured and thus close to the spores avenues through which they entered the fruit. The borax solution thus inhibits rather than kills the spores."

There is no evidence to support this finding. Undoubtedly the borax solution acts on the spores on the fruit to produce the effects noted by Bitting, Boeseken and Waterman. But it is the merest speculation that the borax left on the fruit has any effect whatsoever. The proof submitted by plaintiff in fact indicates that it has no effect.

[fol. 721] Dr. Fuller (R., Vol. I, pp. 138-141) is the only expert witness who appeared for plaintiff. He is the only one of plaintiff's witnesses who gave testimony of an actual comparison of borax-treated and untreated fruit. Two boxes of fruit were shipped to Dr. Fuller from Florida—one a box with high grade fruit, washed, polished and wrap-

ped as well as borax-treated, and the other a box of unwrapped fruit that "were just sent loose in the box. In general they were smaller oranges of inferior appearance" (R., p. 141). They were inspected first on April 15. The spoilage of course was much greater in the inferior, loose, unwrapped and untreated fruit. But by May 1 all the oranges were spoiled (R., p. 139).

Dr. Fuller testified that the treated oranges contained borax on the rind, which he estimated as .02 of 1% calculated on the weight of the orange. This borax did not prevent the oranges from spoiling. The only logical conclusion from Fuller's testimony is that the spores of mold on the treated fruit were rendered temporarily inocuous—or, in the language of Boeseken and Waterman, their development was inhibited by the borax and when the effect of the treatment wore off the oranges spoiled just as did the others, notwithstanding the fact that the borax remained on the fruit.

Borax of course can have no sealing action on the minute abrasions in the skin of the orange. Borax is a dry powder and it stays on the fruit by finding lodgment on the rough surface of the orange. Dr. Fuller's test showed that all the borax is readily washed off the orange. His analyses showed the same amount of borax when removed from the orange by washing and when reduced to ash by burning the peel. The quantity is most minute. Assuming five oranges to a pound, there would be, according to Dr. Fuller's figures, four one hundred thousandths of a pound of borax to the orange, or one pound of borax would be distributed over 25,000 oranges. The most powerful germicides have little [fol. 722] effect in such minute quantities, and all parties to this controversy are agreed that borax is a mild antiseptic.

We submit that the findings above quoted are not based on proof, but on conjecture founded on the voluminous record of unproven documents which plaintiff submitted, "as showing the information that was disseminated in the art, not as proof of the correctness of the facts, as stated here, because many of them are incorrect, but as proof of what the art was being taught in those days."

In re Rivkin, 216 F. R., 218:

"No trier of a question of fact is permitted to venture a guess with the hope that it is correct. Facts can only be

1-8

PLAINTIFFS' EXHIBIT No. 1.

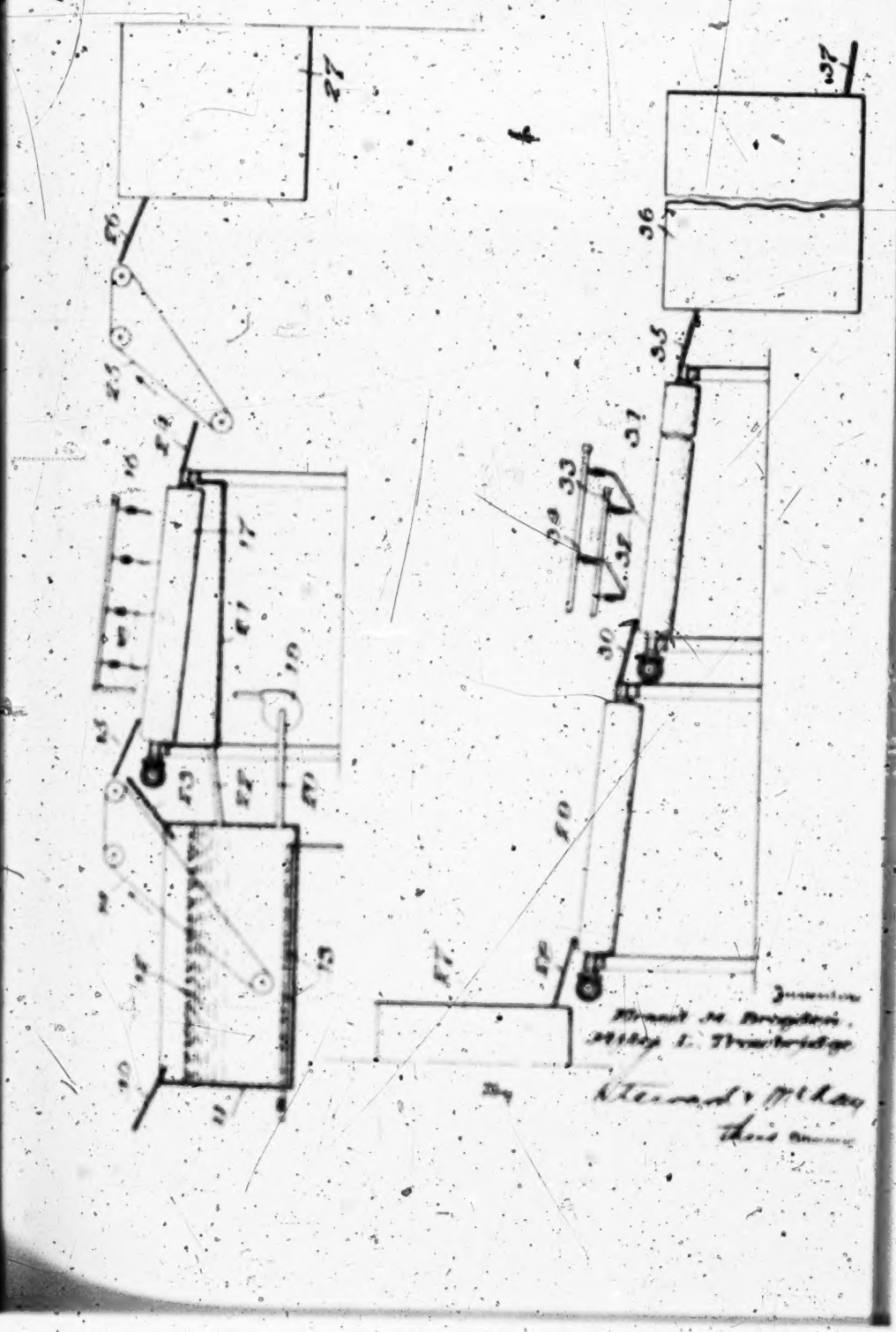
March 10, 1925.

E. M. BROGDEN ET AL

1,529,461

ART OF PREPARING FRESH FRUIT FOR MARKET

Filed Aug. 13, 1923



found upon evidence, and suspicions, however strong, cannot be substituted therefor. This is the universal rule and the only safe rule under which justice can fairly be administered."

Respectfully submitted.

W. B. Morton, of Counsel.

I certify that the foregoing petition for rehearing has been prepared at the request of the American Fruit Growers, Inc., defendant-appellant, that I believe it to be well founded in law and in fact, and that it is not interposed for purposes of delay.

W. B. Morton, of Counsel.

[fol. 723] In United States Circuit Court of Appeals

[Title omitted]

Order Denying Petition for Rehearing—Filed Nov. 15, 1929

And now, to wit, November 15, 1929, after due consideration, the petition for rehearing in the above-entitled case is hereby denied.

Philadelphia, ——, ——.

J. Warren Davis, Circuit Judge.

[File endorsement omitted.]

[fol. 724] Clerk's certificate to foregoing transcript omitted in printing.

(Here follows drawing, side folios 1 and 2.)

[fols. 1-2] Plaintiff's Exhibit No. 1.

[fol. 3] Patented Mar. 10, 1925. 1,529,461

United States Patent Office

Ernest M. Brogden, of Santa Monica, and Miles L. Trowbridge, of Palms, California

Art of Preparing Fresh Fruit for Market

Application filed August 13, 1923. Serial No. 657,215

To all whom it may concern:

Be it known that we, Ernest M. Brogden and Miles L. Trowbridge, citizens of the United States, residing at Santa Monica, county of Los Angeles, California, and Palms, county of Los Angeles, California, respectively, have invented certain new and useful Improvements in the Art of Preparing Fresh Fruit for Market; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to art of preparing fresh fruit for market; and in particular it relates to processes for the treatment of citrus and other fruits in such manner that the development of molds and the like upon the fruit, and especially the development of blue mold and infection by blue mold spores, is prevented or arrested either wholly or to such large extent as greatly to prolong the marketable life of the fruit beyond what has been possible heretofore; the complete treatment most desirably also including a step of providing the fruit with a very thin film-like coating of protective material comprising a waxy substance such a paraffin; all as will more fully hereinafter appear.

The greatest present utility of the invention is in the treatment of citrus fruits such as oranges, grapefruit, lemons, tangerines, etc.; also apples and other fruits that are attacked by blue mold or the like. The invention is broad, however, and the term fruit as herein employed is to be understood as not necessarily restricted to fruit in the sense in which the word is usually employed, but is to be understood broadly as including not only fruit proper but also vegetables, such as tomatoes or the like, that can

be treated to advantage in accordance with the principles of the invention to be hereinafter set forth.

For the sake of a concrete example whereby the principles of the invention may be illustrated and explained, reference will be made hereinafter more particularly to the treatment of citrus fruit, especially oranges and lemons, which are especially subject to attack and destruction by blue mold. It is a well known fact that a large part of the losses from decay in the marketing of various fruits, such as citrus fruits and apples, is attributable directly to the action of blue mold. The problem of how to suppress or control blue mold development on fruits has been the subject of extensive and careful investigation, but admittedly no thoroughly satisfactory solution of the problem has heretofore been offered. In spite of elaborate precautions taken in the handling and transportation of fruits to market, it is not uncommon for shipments of oranges and the like to arrive at marketing points showing in some cases as much as 30 to 40 per cent decay directly attributable to blue mold. The various investigations of the subject have shown that while blue mold does not ordinarily attack perfectly sound fruit that is free from bruises, cuts, thorn-pricks or punctures, the slightest surface cut or scratch affords a point of attack by providing lodgment for blue mold spores which develop with great rapidity and soon bring about complete destruction of the infected fruit. Accordingly, responsibility for decay of citrus and other fruit by the action of blue mold has been laid by investigators primarily at the door of the grower and packer. In gathering the fruit, the use of clippers to cut the fruit stems, and the dumping of the fruit into field boxes or other containers in which they are taken to the fruit packing plant, afford repeated opportunity for the fruit to be injured mechanically in one way or another. Furthermore, modern methods of packing fruit for shipment tend strongly to cause inoculation of perfectly sound fruit with blue mold spores because of the washing and brushing operations to which fruit under modern practice is subjected in the course of packing for market. A single orange afflicted with blue mold can thoroughly infect with blue mold spores the whole body of wash water with which a large quantity of fruit is washed and scrubbed; and any of such fruit that is clipper-cut, thorn-pricked, or that is in the

least scratched or abraded either prior to or during the washing and scrubbing, is altogether likely to become inoculated with blue mold spores from the wash water, with [fol. 4] the result that the blue mold gains a foothold, develops more or less rapidly according to the conditions under which the fruit is transported to market, and accomplishes partial or complete decay of the fruit before it reaches the consumer.

About the only suggestions for suppressing or retarding blue mold growth and the resultant decay that have been offered as a result of the various investigations referred to are recommendations that the growers exercise greater care in picking the fruit and getting it to the packing house; that the fruit packer frequently change the wash water employed and that he brush only very dirty fruit; and that the fruit be pre-cooled and shipped under refrigeration in order to discourage the development of blue mold. As a practical matter, it is hardly feasible commercially to gather large quantities of fruit rapidly and economically without a certain substantial percentage of the fruit being scratched, cut, pricked, or otherwise mechanically injured to a certain extent. This is bound to occur notwithstanding the highest degree of care that can be exercised in commercial practice; and as long as it does occur, the attacks by blue mold cannot possibly be prevented by methods heretofore known, because, owing to the fact that there is practically always some fruit afflicted with blue mold before gathering, blue mold spores are unavoidably present everywhere in the packing house, on the machinery, in the wash water, and floating in the air, ready to infect all fruit having the slightest surface scratch or abrasion, even if so minute as to be undiscernible by the eye. Furthermore, while refrigeration does in fact retard blue mold development to some extent, it is a highly expensive and troublesome expedient; and moreover, after the fruit has arrived at the marketing point and has been distributed to dealers for sale to the consumer, it is not feasible as a rule to keep it under refrigeration, so that large losses occur from the ravages of blue mold during this final period of the distribution to consumers, since refrigeration does not kill but merely temporarily checks to some extent the growth of blue mold or blue mold spores, decay proceeding at an accelerated rate after the fruit is removed from refrigeration.

The present applicants have discovered that by proper treatment of the fruit in the packing house it is possible to greatly reduce, and often to absolutely prevent, the growth or development of blue mold on fruit for long periods of time, and thus to materially lessen or even eliminate the heretofore unavoidable losses from decay. Moreover, it is possible to achieve these results without upsetting or greatly changing present practice so far as concerns the mechanical handling of fruit in packing houses of the modern type. Thorough practical tests of the novel processes have demonstrated conclusively that, by proceeding in accordance with the invention, blue mold development can be arrested, and fruit can be rendered immune to attack by blue mold spores, in a simple and effective manner without affecting the freshness and flavor of the fruit, the marketable life of the fruit being thus prolonged far beyond that of untreated fruit. In view of the well known persistent activity of blue mold spores even under conditions fatal to the parent mold, the importance of this achievement is obvious. In general, the process of the invention involves applying to the fruit a mold-inhibiting reagent comprising the boric acid radical, said compound being most desirably alkaline in reaction and being employed in concentration effective to render the surface of the fruit unfavorable as a medium for blue mold development. Ordinary borax ($Na_2B_4O_7+10H_2O$) has been found after extensive investigation, to be especially potent in its retarding and inhibiting action in this connection, and this substance is considered at present to be the most desirable to employ in practicing the invention. A water solution of borax is alkaline in reaction, but is without corrosive or other deteriorating action upon fruit to which it is applied. Boric acid is not so effective as a mold-retarder as is borax; but compounds of boron, whether acid or alkaline, appear to have a specific inhibiting action upon blue mold; and hence it is not desired to limit the invention, so far as concerns compounds of boron, to the employment of an alkaline treating solution.

The method of applying the treating solution to the fruit may assume various specifically different forms, the precise details of procedure being not essential to the invention in its broader aspects. However, where it is desirable, as may often be the case, to carry out the process

without changing prior practice any more than is strictly necessary, the application of the mold retarding agent may be effected as a part of or in conjunction with the usual washing operation to which the fruit is initially subjected in its handling according to modern packing house methods, especially as most of the mold retarding agents herein contemplated also have excellent cleansing or detergent properties. Accordingly, in the practice of the invention, the mold retarding agent, borax in a specific instance, may be added in proper mold inhibiting quantity directly to the wash water in the usual soaking tank into which the fruit is dumped from the field boxes as it comes from the groves. Moreover, this method has the distinct advantage that the [fol. 5] treating solution comes in contact with the fruit initially before the latter has become wet with ordinary wash water containing no treating agent, so that the treating solution is therefore absorbed or taken up by the fruit rind or skin to a greater extent than it would be had the fruit already been thoroughly wetted. This is especially so where the fruit carries clipper cuts or similar wounds which have dried out to a considerable extent through exposure to the air before the fruit arrives at the packing house. Such dried clipper cuts or similar wounds are in a condition to absorb the treating solution with avidity, the exposed tissues thereby becoming impregnated therewith and this is of great advantage in getting a substantial supply of the treating reagent into the cut or lacerated tissue and rendering it immune to attack by blue mold spores not only at the very outset but also permanently. Accordingly application of the treating solution to the unwashed fruit just as it is received from the groves, as distinguished from application after the fruit has received a preliminary washing with ordinary wash water, is to be strongly recommended as best practice in carrying out the invention. It has been found also that the inhibiting action of the treating reagent is most pronounced when the solution is warm, say at 115° to 130° F. or thereabouts, and accordingly a warm solution is employed in the best embodiment of the novel method. The bath of treating solution should not be hot enough, however, to scald or cook the fruit. The strength or concentration of the treating solution may be varied considerably within reasonable limits, but one es-

perience with all of the reagents hereinabove referred to has been that it is desirable, although not always essential that the solution contain at least about 5 per cent by weight thereof, which is equivalent to from 6 to 7 ounces per gallon of the water employed in making up the solution. In the case of borax, this is about as strong a solution as can be made up with ordinary cold water; but in operating with water warmed to 115° or 120° F., a larger percentage of borax can be held in solution and it is generally desirable to use such stronger solution. In general, a solution containing 2 per cent or more of borax may be characterized as a strong solution. A warm solution containing as much as 20 per cent of borax has proved highly effective in practice, but one containing from 10 to 15 per cent of borax has also given excellent results and in most cases proves amply concentrated for the purposes in view. In any case it is desirable that the solution contain several per cent of borax, that is, at least about 2 per cent. The solution should not contain ingredients substantially diminishing its fluidity or otherwise interfering with ready penetration of the solution into exposed rind or skin tissues.

Most desirably the application of the treating solution to the fruit includes not only passing the fruit through the soaking tank but also subjecting it to a thorough rubbing or scrubbing with the same or a similar solution in a fruit-washing machine of the usual or any suitable type. In case through the washing machine, the fruit may be sprayed with solution pumped from the soaking tank, the excess being returned to the soaking tank and used over and over again in circuit. The thorough rubbing given the fruit while wet with the borax solution is found to be very important in securing the most effective mold-inhibiting action on the fruit. Minute air bubbles trapped in the pores and crevices of the rind or skin of the fruit, and in cuts, scratches, or other wounds often so small as to be practically undiscernible, which bubbles tend to prevent intimate wetting contact of the solution with the entire surface of the fruit, are effectively dislodged by the rubbing or scrubbing treatment on the brush rolls of the washer and effective access of the treating solution to every part of the surface and exposed tissue of the fruit rind is thereby rendered more certain. Notwithstanding the fact that the

fruit dumped into the soaking tank usually includes some affected with blue mold, experience with the present process has shown that the mold spores are rendered innocuous by the mold retarder in sufficient concentration, and that application of such wash solution to fruit, even though the fruit be clipper cut or otherwise superficially injured, does not cause the fruit to become infected. Nevertheless, the water in the soaking tank should be changed with reasonable frequency, since it becomes very dirty after large quantities of fruit have been run through it and therefore ought to be renewed occasionally as an ordinary sanitary measure. As an additional precaution, the fruit after being washed with the treating solution as described, may be sprayed with entirely fresh treating solution, but this is ordinarily unnecessary, especially where the soaking tank solution is changed reasonably often.

In handling fruit in accordance with the practice heretofore customary, the fruit upon leaving the washing machine is conveyed into and through a drier for the purpose of evaporating off the surface moisture as far as is practical. In practicing the process of the present invention, the same general procedure may be followed to advantage, the fruit after being thoroughly rubbed or scrubbed with the treating solution going directly to the drier. It is permissible within the scope of the invention, to rinse [fol. 6] the fruit with clean water containing no treating reagent after it leaves the washing machine and before it enters the drier; but frequently the best practice, especially with weak fruit, is to allow the fruit to go directly to the drier without rinsing. The fruit, after passing through the drier, carries a substantial deposit of the solid treating reagent, borax in the specific example here in question. The stronger the treating solution employed, the greater is of course the amount of this surface deposit of white pulverulent material on the fruit. If this were allowed to remain on the fruit, the fruit might be unmarketable because of its appearance, and hence the fruit may be next treated to remove this superficial deposit. This can be accomplished most effectively by a dry brushing or rubbing of the fruit, most desirably by means of rotary cylindrical brushes of horsehair or the like operating at relatively high speed. By the action of such rotary brush means the deposit of

solid treating reagent is rapidly removed from the surface of the fruit so far as the eye can determine; but as a matter of fact, and this is highly advantageous, the fruit still carries a substantial amount of the borax or other treating reagent which has been carried into the surface pores, and especially into any wounded skin tissues, by the treating solution; so that after this brushing treatment the skin or rind of the fruit is still provided with a well distributed but substantially invisible supply of mold-retarding agent sufficient to protect it for long periods against infection or attack by blue mold spores and the like. It will now be appreciated why it is better practice not to rinse the fruit with pure water after it leaves the washer and before it enters the drier. The interposed rinsing, while it would diminish or perhaps entirely eliminate the objectionable visible white deposit upon the fruit as it comes from the drier, may also reduce the amount of treating material finally remaining in and upon the surface tissues of the fruit and would thus tend to lessen the resistance of the fruit to infection.

From this point on, the handling of the fruit in further preparation for boxing and shipment may or may not involve additional preservative treatment in accordance with the principles of the invention. This depends upon whether or not the fruit is to receive an application of protective coating material for the purpose of preventing or reducing shrinkage and withering and of ensuring conservation of the original freshness and flavor of the fruit for prolonged periods of time. Generally this further treatment is highly desirable, and if the benefits of the invention are to be realized to the fullest extent, this further treatment should be carried out. It consists in applying to the fruit a normally solid protective material, especially paraffin or like waxy material, in such condition that it can be spread all over the surface of the fruit to produce an extremely thin protective film which is not noticeable except by the expert eye and does not interfere with the so-called breathing or transpiration of the fruit to an undesirable extent, but which is effective to conserve the original plumpness and freshness of the fruit as above stated.

While the process of the invention may be carried out with the aid of various types of apparatus, one desirable

practical form of apparatus installation that gives satisfactory results in treating oranges, for example, is shown more or less schematically and diagrammatically in side elevation in the accompanying drawing. In using this apparatus system to carry out the new process in one of its practical embodiments, fruit just as received from the grower is delivered over chute board 10 into wash tank or soaking tank 11 containing a water solution of a mold-retarding agent of the character herein set forth, the level of the liquid in the tank being indicated at 12. It will be assumed that in this instance the solution in the tank is a 10 to 15 per cent solution of borax, and that it is maintained at a temperature around 115° to 120° F. by suitable heating means such as steam coils 13. The fruit (e. g. oranges) dumped into the soaking tank 11 floats gradually toward an elevator of any suitable type, conventionally indicated at 14, the fruit being thoroughly wetted with the treating solution en route. The elevator conducts the wet fruit up out of the tank and delivers it over chute board 15 to a fruit washer 16 which may be of tunnel or any suitable type. In the present instance said fruit washer is of a cylindrical brush roll type well known in the art, one of the brush rolls being indicated at 17. As the fruit passes down along the brush rolls, which may be gently inclined toward the delivery end as shown, it is sprayed with treating solution supplied through overhead spray jets 18 by a pump 19 which draws its supply through pipe 20 from the soaking tank 11. The excess solution falls from the brush rolls of the fruit washer into a drip pan 21 and is returned through pipe 22 to the soaking tank. A drip board 23 is also provided to return drip from the elevator 14 to said tank. The circulation and repeated use of the solution is desirable not only because it effects economy in the amount of treating solution used and heat units expended, but also because it helps to maintain uniformity in the concentration of the solution.

After receiving a thorough rubbing and scrubbing in the washer 16, the cleansed and treated fruit is discharged [fol. 7] over chute board 24 to suitable conveyor means such as elevator 25 which delivers it over chute board 26 to a fruit drier of any well known or suitable type indicated conventionally at 27. In this drier, the greater part of the

surface moisture is gradually evaporated from the fruit, although it is not essential to success of the process that this drying be perfectly complete. Where the treating solution is fairly strong, however, it is desirable from the standpoint of the final appearance of the fruit, that sufficient drying occur to enable ready removal of the superficial excess of the mold retarding agent by the subsequent rubbing treatment. From the drier, the fruit passes over chute board 26 to suitable brushing and rubbing means which may desirably be of the brush roll type indicated generally at 29. While this apparatus may be a brush roll polisher such as is common in the art, better results are obtainable by the use of a novel form disclosed and claimed in the application of H. M. Brogden, Ser. No. 653,227, filed July 23, 1923. In apparatus 29, the fruit is thoroughly rubbed by the brushing surfaces of the rolls which are advantageously of horsehair and are desirably driven at relatively high speed, the white powdery deposit of borax left on the surface of the fruit after drying being dusted off by these rolls. The mechanism should be of such character and design as to ensure turning the fruit on various axes so that all portions of its surface may be subjected to effective brushing and rubbing.

From the brush roll mechanism 29, the fruit rolls down over chute board 30 to another brush roll mechanism indicated generally at 31 above which near the upper or receiving end is located suitable spraying means such as air brushes indicated conventionally at 32, said air brushes serving to direct fluid coating material in atomized condition down upon the fruit as it enters the unit 33. Most desirably this coating material comprises paraffin and a solvent thereof thoroughly intermingled to provide a thinly fluid mixture that can be spread in an extremely thin film over the fruit by the action of the brush rolls. Both the liquid supply jet pipes 33 and the cooperating compressed air jets 34, which comprise the air brush devices are suitably valved, as shown, so that the proper quantity of coating material projected upon the fruit entering unit 31 can be accurately adjusted to the optimum amount. An especially desirable solvent for use in the wax coating material or composition before mentioned is a refined light mineral oil of the kerosene type which may be obtained in the distilla-

tion of petroleum. In a typical instance this distillate may have a specific gravity of about 0.810, a flash point of about 149° F., and an approximate boiling range of 360° to 486° F. The waxy material employed may desirably constitute from 5 to 20 per cent of the composition.

Another satisfactory coating mixture of suitable fluent character may consist of 1 part of paraffin wax, and 2 parts of a highly refined low viscosity white mineral oil, which is odorless, tasteless and colorless. Such an oil may, for example, be of about 0.840 specific gravity, and have a viscosity of 70-73 seconds at 100° F., a flash point of 349°-350° F., and a boiling range approximating 600° to 745° F.

The wax-containing mixtures or compositions hereinabove disclosed are not claimed herein, the same constituting the subject matter of prior copending applications of one of the present applicants.

After receiving a small amount of coating material from the air brushes upon entering brush roll unit 31, the fruit continues to pass down the brush roll runway or runways and is subjected to a very thorough rubbing by the horsehair surfaces of the brush rolls which are rotated at sufficiently high speed to ensure spreading out the small quantity of coating material applied to each fruit into a protective film coating of microscopic thinness. The brush rolls of unit 31 may advantageously be quite long in order that, after receiving the initial application of coating material by the air brushes at the receiving end, the fruit then travels a comparatively long distance in contact with the rapidly moving brushing surfaces, whereby the brushing action is thoroughly effective to produce a protective coating of the desired extreme thinness.

After leaving unit 31, the fruit passes over chute board 35 and travels through fruit drier 36, where it is subjected to currents of air, most desirably suitably warmed. This treatment results in the evaporation of residual moisture upon the surface of the fruit and also of at least a part of the hydrocarbon solvent, if a volatile solvent was employed in the waxy coating composition.

Leaving the drier over chute board 37, the fruit then goes to the graders and sizers and is ready to be shipped in the usual manner with the exception, however, that precooling and refrigeration are not necessary, provided the

cars in which the fruit is shipped are reasonably well ventilated.

Fruit treated with any of the solutions hereinabove described should be subjected to the action of the solution for a sufficient time to ensure thoroughly effective mold-inhibiting action. Where a warm treating solution is used, it is usually sufficient for the fruit to remain two or three minutes in the soaking tank before it goes through the washer; but where cooler and less concentrated solutions are used, a [fol. 8] longer soaking period is advantageous. As before pointed out, it is sometimes feasible to rinse the fruit with plain water after subjecting it to the action of the treating solution and before it enters the drier, and in the case of citrus fruits particularly, this can be done especially during the early part of the shipping season when the fruit is firm and in exceptionally good condition. However, where the fruit is "weak," as it commonly is during the latter part of the season when riper fruit is being picked and shipped, the interposed rinsing is sometimes not to be recommended. The procedure involving rinsing of the fruit after treatment with the mold-inhibiting solution is not specifically claimed herein, this particular procedure constituting in part the subject matter of a copending application of one of the present applicants.

In the foregoing disclosure of the principles of the invention, reference has been made more particularly to blue mold as a source or cause of decay. Such reference to blue mold is to be taken, not as restrictive, but as generic and as intended, both in the specification and in the claims, to cover not only blue mold but all kindred rot and decay organisms and diseases generally amenable to treatment in accordance with the invention, to which fruit is or may be susceptible and by which it may be damaged under the conditions prevailing in packing and marketing.

What is claimed is:

1. In the preparation of fresh fruit for market, the process which comprises subjecting fruit to the action of an aqueous solution of a compound comprising the boric acid radical having a retarding action on the development of blue mold, the fluidity, strength and temperature of the treating solution, and the duration of the treatment, being

such that exposed rind or skin tissues of the fruit are effectively impregnated with said compound and rendered resistant to blue mold decay, while at the same time the fruit is not scalded nor is its freshness or edibility otherwise substantially impaired.

2. In the preparation of fresh fruit for market, the process which comprises subjecting fruit to the action of an aqueous solution of an alkali metal borate, the fluidity, strength and temperature of the treating solution, and the duration of the treatment, being such that exposed rind or skin tissues of the fruit are effectively impregnated with said borate and rendered resistant to blue mold decay, while at the same time the fruit is not scalded nor is its freshness or edibility otherwise substantially impaired.

3. In the preparation of fresh fruit for market, the process which comprises subjecting fruit to the action of an aqueous solution of borax, the fluidity, strength and temperature of the treating solution, and the duration of the treatment, being such that exposed rind or skin tissues of the fruit are effectively impregnated with borax and rendered resistant to blue mold decay, while at the same time the fruit is not scalded nor is its freshness or edibility otherwise substantially impaired.

4. In the preparation of fresh fruit for market, the process which comprises subjecting fruit to the action of an aqueous solution containing at least 5 per cent of borax, the fluidity, strength and temperature of the treating solution, and the duration of the treatment, being such that exposed rind or skin tissues of the fruit are effectively impregnated with borax and rendered resistant to blue mold decay, while at the same time the fruit is not scalded nor is its freshness or edibility otherwise substantially impaired.

5. In the preparation of fresh fruit for market, the process which comprises subjecting fruit to the action of an aqueous solution containing at least 5 per cent of borax, said solution being at a temperature above 100° F. and most desirably approximating 115° to 120° F., the fluidity of the solution and the duration of the treatment being such that exposed rind or skin tissues of the fruit are effectively impregnated with borax and rendered resistant to blue mold

decay, while at the same time the freshness and edibility of the fruit remain substantially unimpaired.

6. In the preparation of fresh fruit for market, the process which comprises applying to fruit an aqueous solution of a solid mold-retarding agent comprising borax, and allowing a sufficient quantity of said solution to evaporate upon the surface of the fruit to leave thereon a substantial deposit of said solid agent.

7. In the preparation of fresh fruit for market, the process which comprises soaking and rubbing fruit for at least 2 minutes with a warm solution of an alkaline mold-retarder comprising borax, and allowing the fruit to dry without rinsing off the liquid of said bath.

8. In the preparation of fresh fruit for market, the process which comprises first soaking the fresh fruit for several minutes with a water solution of a mold-retarding agent comprising borax, and then rubbing the fruit with such solution whereby to ensure intimate wetting contact of the solution with the entire surface of the fruit.

9. In the preparation of fresh citrus fruit for market, the process which comprises soaking fresh citrus fruit with an aqueous solution of borax for at least 2 minutes, and thereafter removing surface moisture from the fruit, the fluidity, strength and temperature of the solution, and the duration [fol. 9] of the treatment, being such that exposed rind or skin tissues of the fruit are effectively impregnated with borax and rendered resistant to blue mold decay, while at the same time the fruit is not scalded nor is its freshness or edibility otherwise substantially impaired.

10. In the preparation of fresh citrus fruit for market, the process which includes the steps of soaking unwashed fresh citrus fruit as it comes from the grove in an aqueous solution of borax heated to above the temperature of the surrounding atmosphere but insufficiently hot to scald or cook the fruit, rubbing the fruit while it is still wet with borax solution, and thereafter removing surface moisture from the fruit, the fluidity and strength of the treating solution, and the duration of treatment, being such that exposed rind or skin tissues are effectively impregnated with borax and rendered resistant to blue mold decay, while at

the same time the freshness and edibility of the fruit are not substantially impaired.

11. In the preparation of fresh citrus fruit for market, the process which includes the steps of soaking unwashed fresh citrus fruit as it comes from the grove in a body of wash water containing dissolved therein a mold-inhibiting percentage of borax, then removing the fruit from said body of wash water and rubbing it thoroughly while showering upon it more of said wash water, the excess of wash water thus showered upon the fruit being returned to the aforesaid body of wash water for re-use.

12. In the preparation of fresh citrus fruit for market, the process of controlling blue mold decay which includes the step of cleansing the unwashed fruit as it comes from the grove by means of wash water containing at least 5 per cent of borax.

13. In the preparation of fresh citrus fruit for market, the process of controlling blue mold decay which includes the step of cleansing the unwashed fruit as it comes from the grove by means of a mold-inhibiting solution of borax, the fluidity, strength and temperature of the solution, and the duration of the treatment, being such that exposed rind or skin tissues of the fruit are effectively impregnated with borax and rendered resistant to blue mold decay, while at the same time the fruit is not scalded nor is its freshness or edibility otherwise substantially impaired.

14. In the preparation of fresh citrus fruit for market, the process which comprises advancing the fresh fruit in a traveling stream over a predetermined path, maintaining the fruit wet with a warm solution of borax for a period of at least 2 minutes during such travel, the fluidity, strength and temperature of the solution, and the duration of the treatment, being such that exposed rind or skin tissues of the fruit are effectively impregnated with borax and rendered resistant to blue mold decay, while at the same time the fruit is not scalded nor is its freshness or edibility otherwise substantially impaired, and further treating the fruit at subsequent stages in its travel to effect removal of surface moisture and surface excess of borax, while avoiding removal of borax to such an extent as would destroy resistance of the fruit to blue mold decay.

15. In the preparation of fresh fruit for market, the process which comprises advancing fresh fruit in a traveling stream over a predetermined path, applying to said fruit as it travels over a portion of said path a strong solution of borax while causing the fruit to turn over and over, subjecting the fruit as it travels over a subsequent portion of said path to a drying treatment for removal of surface moisture therefrom, and then rubbing the fruit.

16. In the preparation of fresh fruit for market, the process which comprises impregnating exposed rind or skin tissues of fresh fruit with a compound comprising the boric acid radical to an extent sufficient to render such fruit substantially immune to attack by blue mold.

17. In the preparation of fresh fruit for market, the process which comprises impregnating exposed rind or skin tissues of fresh fruit with a compound comprising borax to an extent sufficient to render such fruit substantially immune to attack by blue mold.

18. In the preparation of fresh fruit for market, the process of protecting the same against blue mold which includes the step of maintaining fresh fruit wet for at least 2 minutes with an aqueous solution containing between 5 and 15 per cent of borax the temperature of said solution being above 100° F. but being insufficiently high to injure the fruit.

19. In the preparation of fresh fruit for market, the process which comprises contacting the entire surface of fresh fruit with a solution containing borax in sufficient concentration to exert pronounced mold-inhibiting action, and thereafter applying to the fruit so treated a thin, filmlike protective coating comprising waxy material.

20. In the preparation of fresh fruit for market, the process which comprises contacting the entire surface of fresh fruit with an aqueous solution containing a compound comprising the boric acid radical having a retarding action on the development of blue mold, the fluidity, strength and temperature of the treating solution, and the duration of the treatment, being such that exposed rind or skin tissues of the fruit are effectively impregnated with said compound [fol. 10] and rendered resistant to blue mold decay, while

at the same time the fruit is not scalded nor is its freshness or edibility otherwise substantially impaired, and thereafter applying to the fruit so treated a thin, film-like protective coating comprising waxy material.

21. In the preparation of fresh citrus fruit for market, the process which comprises maintaining said fruit wet with an aqueous solution of borax for a period of at least 2 minutes, the fluidity, strength and temperature of the borax solution, and the duration of the treatment therewith, being such that exposed rind or skin tissues of the fruit are effectively impregnated with borax and rendered resistant to blue mold decay, while at the same time the fruit is not scalded nor is its freshness or edibility otherwise substantially impaired, drying the surface of the fruit, and providing it with a thin, film-like protective coating comprising waxy material.

22. In the preparation of fresh citrus fruit for market, the process which comprises maintaining said fruit wet with a strong borax solution for a period of at least 2 minutes, the fluidity, strength and temperature of the borax solution, and the duration of the treatment therewith, being such that exposed rind or skin tissues of the fruit are effectively impregnated with borax and rendered resistant to blue mold decay, while at the same time the fruit is not scalded nor is its freshness or edibility otherwise substantially impaired, removing from the surface of the fruit moisture and unnecessary excess of borax while avoiding removal of so much borax as to destroy resistance of the fruit to blue mold decay, and rubbing the fruit with waxy material to provide it with a thin, film-like protective coating.

23. Fresh fruit of which the rind or skin carries a non-poisonous mold-inhibiting compound comprising the boric acid radical, the amount of said compound present being very small but sufficeint to render the fruit resistant to blue mold decay.

24. Fresh fruit of which the rind or skin carries borax in amount that is very small but sufficient to render the fruit resistant to blue mold decay.

25. Fresh citrus fruit of which the rind or skin carries a non-poisonous mold-inhibiting compound comprising the

boric acid radical, the amount of said compound present being very small but sufficient to render the fruit resistant to blue mold decay.

26. Fresh citrus fruit of which the rind or skin carries borax in amount that is very small but sufficient to render the fruit resistant to blue mold decay.

27. Fresh citrus fruit as defined in claim 25, further characterized by the fact that its surface is provided with a thin film like protective coating of waxy material.

28. Fresh citrus fruit as defined in claim 26, further characterized by the fact that its surface is provided with a thin film-like protective coating comprising paraffin.

In testimony whereof we hereunto affix our signatures.

Ernest M. Brogden, Miles L. Trowbridge.

[fol. 11] PLAINTIFF'S EXHIBIT No. 2

University of California Publications

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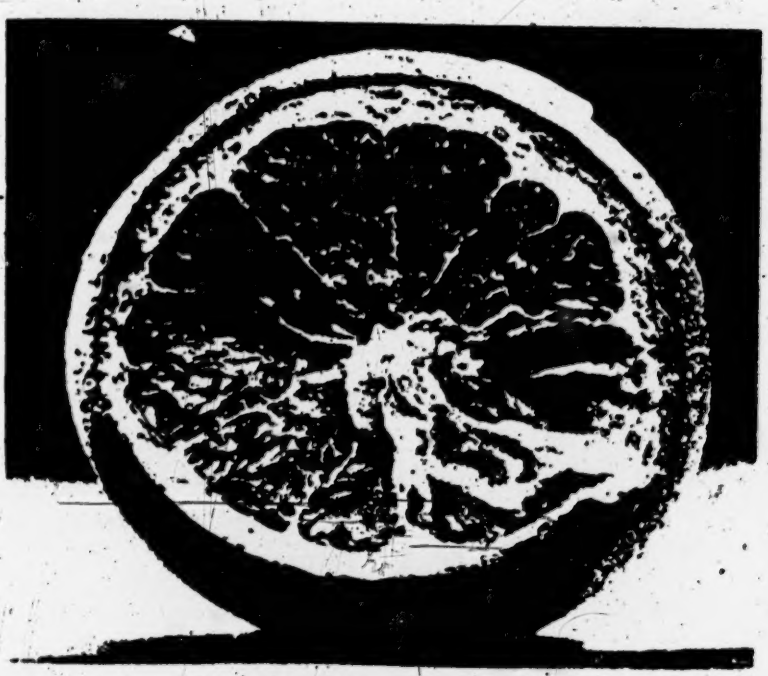
Agricultural Experiment Station

E. W. Hilgard, Director

Orange and Lemon Rot

By C. W. Woodworth



Navel Orange, One Fourth Showing the Effect of the Rot

Bulletin No. 139

(Berkeley, February, 1902)

Sacramento:

A. J. Johnston, Superintendent State Printing

1902

[fol. 12] Orange and Lemon Rot

By C. W. Woodworth.

The present season has been more than usually favorable to the decay of oranges, especially in early shipments.

Every year the loss from the rotting of both oranges and lemons is very considerable. The cause of the rot and the precautions that should be taken to avoid the trouble are very rarely understood by those who handle the fruits; and there can be no doubt that a fuller knowledge of the subject would enable growers and shippers to avoid much of the loss. The present bulletin is prepared in response to requests from numerous growers for information on this subject.

The Cause.—The cause of the rot of oranges and lemons is the growth, through their substances, of a mold fungus known scientifically under the name of Penicillium digitatum. The growth of this plant within the fruit causes a softening and breaking down of the tissue, a very characteristic change in the flavor of the juice, and sooner or later a very pronounced discoloration of the affected part. The fungus belongs to a genus consisting of a number of well-known species, all having much the same manner of growth and producing decays on various substances. The name "blue mold" applies to the whole group. The best known species is Penicillium crustaccum, or, as it is more commonly called, Penicillium glaucum. This species is one of the common forms of rot-producing fungi that attack deciduous fruits, but it is probably even better known from its attack upon all manner of substances in the household, such as cooked foods, clothing, etc. While Penicillium crustaccum is thus found in a great variety of situations, it appears that Penicillium digitatum attacks only citrus fruits, confining itself wholly to these.

Nature of the Fungus.—The form of the fungus while it is growing through the tissue of an orange is that of innumerable fine white threads, known as "vegetative or growing mycelium," the individual threads being called "hyphæ." (Plate 1.) These hyphæ penetrate the fruit in much the same way as the root-hairs of higher plants penetrate the soil. Indeed, they are quite similar, except that the hyphæ are not attached to a more complicated organ like the rootlet from which the root-hair springs. After the vegetative

PLATE 1. Vegetative mycelium from a culture of the fungus in water. Very much magnified.

PLATE 2. Rotten orange, party unwrapped, showing mold in white and blue condition

[fol. 14] mycelium has somewhat exhausted the substances of the fruit, or if the latter becomes too dry for rapid growth, the fungus prepares to develop a form of fruit of its own. Fruiting hyphæ grow outward to the surface of the fruit, or, as is sometimes the case if there is a cavity within the fruit, they grow to the surface of the cavity and there form the fruiting mycelium. This is a dense mass of threads, white in color and soft and downy in texture (Plate 3). It is this stage of the growth that the growers

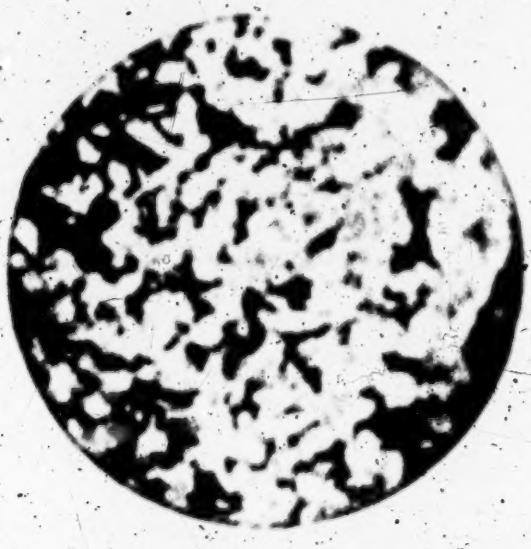


PLATE 3. Fruiting hyphæ in the "white mold" condition. Surface view as seen under the microscope. The same fruit shown in Plate 2

call "white mold." It is merely a stage in the development of the fungus following the growth of the vegetative mycelium within the fruit, and the fruiting hyphæ are, as it were, the fruit spurs upon which the corp of the fruit of the fungus will be borne. The fruit of the fungus consists of minute, oval bodies, called spores, of dull, greenish-blue color. When they become numerous enough to hide the white mycelium upon which they are borne, the whole surface changes to blue, and it is then called "blue mold." (Plate 2.) The fruiting hyphæ producing the spores first divide into a number of branches, suggesting the name of the species ("digitatum," or fingered), and each of these branches as they increase in length become constricted, and

finally divide into a large number of oval fruits, the conidia-spores, which for a long time hang together like a string of beads. (Plate 4.) They are easily broken apart, how-

PLATE 4. Conidia-spores,—still more enlarged

ever, and produce then a fine powder that can be carried by the wind, and so are distributed far and wide.

[fol. 15] There is another form of fruit produced by plants of this genus Penicillium, known as the asco-spores, being formed in little sacks called asci; but they occur only rarely, and, as far as we know, have not been recognized in this species. They doubtless occur, however, and enable the fungus to pass seasons that would kill most of the conidia-spores. The conidia-spore is the means of rapid reproduction, and the only one that is highly significant from the practical standpoint, because it is responsible for practically all of the infection of our fruit with the rot disease.

When and Where It Enters the Fruit.—The rot of citrus fruit is not usually a disease of the orchard. In lemons the infection occurs almost entirely in the curing-house; and in oranges, as a rule, after they are packed and on their way to the East. Navel oranges, however, very often come into the packing-house badly infected by the disease. The trouble begins at the navel end, and may be scarcely visible from without; though commonly a slight split, or

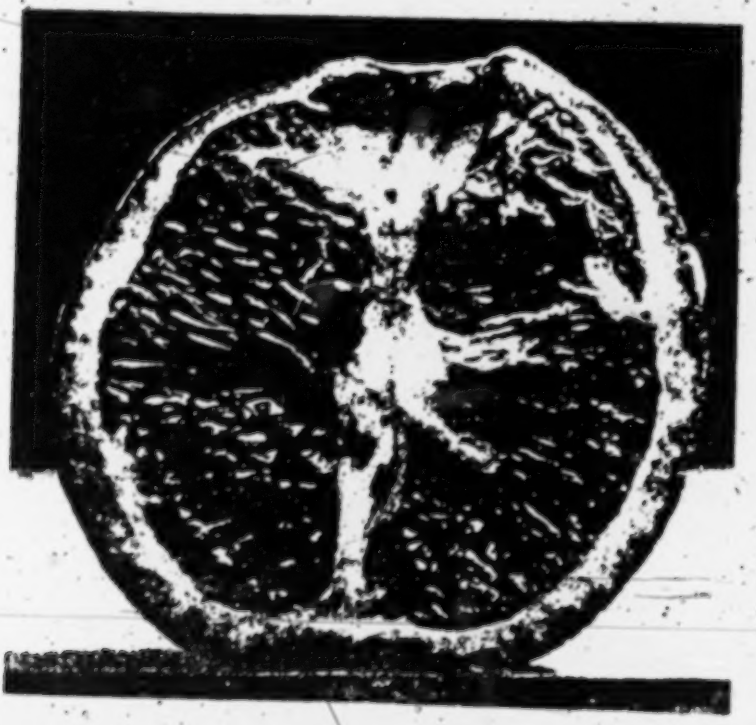


Plate 5. Navel orange, showing rotten spot.

perhaps a little gum, will indicate the point of entrance of the fungus. (See Frontspiece and Plate 5.) In this case the trouble clearly arose in the field, and even began before the fruit was ripe. It is usually confined to a limited part of the fruit, perhaps the upper end of one or two sections, and very often produces spores within the cavity [fol. 16] caused by the shrinkage of the affected tissue, so that the affected part may be badly discolored. In any citrus fruit a bad wound of the surface is apt to be followed by the development of the disease in the tissue just beneath, with the general characteristics specified above as occurring in Navels.

In the packing house or in transit the point of attack may be the navel end, but it is more commonly where two fruits are pressed together. Usually only one of the fruits so touching is affected at first, though after it becomes thoroughly rotted the disease usually communicates to the other. If the conditions are favorable to the growth of

the fungus, it may spread from a single affected fruit to all those adjacent, and in time to the whole box.

How It Enters the Fruit.—This disease, being entirely a matter of the fruit and belonging particularly to ripe fruit, evidently always gains its entrance to the fruit from the outside and never from the tree. The conditions necessary to accomplish this are:

First—That the spore of the fungus should rest upon or near the surface of the fruit. It may be carried there by the wind, or by touching decayed fruit upon which the spores are being produced.

Second—Sufficient water upon the surface of the fruit to cause the germination of the fungus.

Third—The right condition of temperature. The fungus will grow in such a range of temperatures, however, that this condition may be considered to be practically always present.

The germination of the spores of the fungus is thus seen to be much the same as the germination of the seed of a higher plant.

The reason that the navel end is particularly liable to the attack of the rot fungus is that in case a drop of moisture finds its way within this structure, it is less liable to rapid evaporation, and so favors the germination of any spores that may also find their way there. The same explanation accounts for the common abundance of this fungus in fruit with broken skin. The point at which moisture will accumulate and remain longest when fruit is sweating after packing, or while it is stored in the packing- or curing-house, is the point where the fruit touches an adjacent fruit; and at this point, therefore, the germination of the fungus most commonly occurs.

Preventive Measures

From the above review of the manner of growth of the fungus producing the rot of these fruits, it is evident that our preventive measures must lie wholly along one of two lines: either by preventing the spores from gaining access to the surface of the fruit, or by the prevention of the germination of the spores after they are there. For the [fol. 17] latter purpose several methods have been employed, usually without knowledge of the reason of their efficiency, and therefore often in a manner to defeat the very object

sought. Those that have proven valuable are Refrigeration, Ventilation, and Wrapping.

Effects of Refrigeration.—One of the most available means for absolutely preventing the growth of the fungus, even though abundant upon the surface of the fruit, is to so lower the temperature where it is stored that the fungus will not grow. This method is followed very largely by shippers of green deciduous fruits, who have to contend against the closely related Pe-icillium crustaceum. If sufficient refrigeration is maintained, the fruit will be entirely safe from the attack of the fungus. In the use of refrigeration it should be clearly understood that the cold temperature is likely to condense a large amount of water upon the fruit, and as soon as the temperafure is allowed to rise to the point where the fungus can grow, the conditions are extremely favorable for its rapid germination. This has given rise to the belief of many that fruit taken out of refrigeration is much more subject to rot than it was before. The skin may have really become softened by the water during refrigeration, so that this may in some measure be true. The common experience that washed fruit rots worse than that which is brushed dry, may be true for a similar reason. But in any case, the presence of water upon the fruit is always essential for the entrance of the fungus; and if fruit taken from refrigeration is immediately thoroughly dried by arranging for sufficient ventilation, there would be no greater susceptibility on account of the cooling. The use of refrigeration for citrus fruits will probably never be resorted to as extensively as for deciduous fruits, for the reason that the control of rot is not so difficult a matter.

Effects of Ventilation.—The use of ventilated cars, or the ventilation of the curing-house, is chiefly calculated to prevent the rot by carrying off the moisture that may accumulate on the fruit in the sweating process, or on account of the rapid lowering of the temperature. The cooling that is accomplished by the evaporation of this moisture is sometimes thought to act like refrigeration, and may, it is true, slightly decrease the rate of growth of the fungus after it germinates, but can not produce a temperature low enough to prevent its germination and growth. Certainly, the important matter in ventilation is the rapid removal

of any condensed moisture that may gather on the fruit. If this moisture is removed promptly enough, so as not to give time for the germination of this mold fungus, the fruit will not decay, but will stay sound until it would ultimately dry up and mummify.

The problem in ventilation, then, is to maintain the mean, and avoid on the one hand too much drying, and on the other the presence of water for any considerable period [fol. 18] upon the surface of the fruit. In small lots this is not particularly difficult, but in larger rooms there is some difficulty in securing a uniform ventilation; and therefore it is desirable, especially in curing lemons, that the temperature be kept as uniform as possible; particularly avoiding rapid lowering of temperature that might result in the deposition of water on the fruit.

Effects of Wrapping.—The practice which is almost uniformly adopted for citrus fruits, and which is rapidly extending also to deciduous fruits, viz, wrapping them in tissue paper, is an extremely efficient means of decreasing danger from rotting. The reason for this is that the paper absorbs water very freely and will take up a very considerable quantity. The paper will have to become very wet before it will give up enough to the spores of the fungus to permit them to germinate, and so it regulates the matter to a large extent; because when the temperature falls the paper merely becomes moist, and when the temperature rises this moisture is evaporated, and if there is fair ventilation it will be carried off and the fruit never become really wet. If the fruit sweats too much, however, owing to poor ventilation or rapid lowering of temperature, the paper will not be sufficient to prevent the accumulation of the water on the fruit and the germination of any spores that may be there. Only within certain limits, therefore, is the wrapping of fruit a preventive of infection by the fungus.

Destruction of the Spores

Thus far we have considered measures that have been employed to prevent the germination of the spores. Quite as important a matter is that of decreasing their abundance. This is a subject that has not been given the attention that it should have. I doubt if there is a packing-

house in the State in which, in the midst of the season, the odor which is so characteristic of the spores of this fungus is not at once evident to every visitor. It would appear almost surprising if a single fruit could escape the presence of the spores of the mold upon its surface if it passes through some of the packing-houses in which the dust is so filled with them. The means that may be employed to diminish the number of spores in the packing- or curing-house are of three kinds: disposal of infected fruit, disinfection of the house in summer, and the use of sulfur.

Disposition of Decayed Fruit.—It is a common practice to throw decayed fruit in a pile in the immediate vicinity of the packing- or curing-house; and here it continues to decay and produce countless millions of spores, which are freely carried by the wind, and to this is due the thorough infection of the atmosphere, referred to above. There is [fol. 19] no means better calculated to disseminate the disease than this practice. Fruit should never be allowed to become "blue". By the time it reaches the white-mold stage it should either be destroyed by fire, or, what is probably more feasible, be buried. If it is buried deep enough, so that it will not be turned up by plowing, or in any other manner, the decay of the fruit will be completed, and in time the spores of the fungus will disintegrate and the disease will not spread. When the fruit is stored in bins for some days, so that infected fruit will have time to become moldy, these moldy fruits should be removed with great care, so as not to scatter the spores. Attention to this matter can but have a beneficial effect upon the prevalence of the disease.

Summer Disinfection.—In practically all parts of the State the long, dry summer period affords a very available time for the thorough disinfection of the packing-house. The mold spores can be killed by protracted drying, and it should be the practice to so thoroughly air all packing-houses during the hottest and driest part of the summer, that they will be entirely free from the fungus for the beginning of the next year's campaign. In most places this is a very easy operation, and should never be neglected where feasible.

Sulfuring.—When it is not possible to disinfect the house in the summer by drying, as suggested above, or by white-

washing, it may be possible to destroy the spores by the free use of sulfur. This is also possible during the actual packing season. The sulfur should be burned so that the fumes will come in contact with every part of the inside of the packing- or curing-house. Usually these buildings are not tight enough to permit of very thorough work, so that no prescription of the amount to use can be safely made. The material is not expensive, so that the best policy is to use it very liberally whenever the presence of the fungus in quantity is known or suspected to exist in the house.

Orchard Practice

A great deal of fruit undoubtedly goes into the packing-house already covered with the spores of this rot-fungus. As much carelessness in the disposal of rotten fruit is seen in the orchard as has been pointed out above as occurring about the packing-house. Rotten fruit is very commonly allowed to fall upon the ground, and is turned under with the plow, to be turned up again in subsequent cultivations. In almost any orchard in which the disease is prevalent, one would not have any difficulty in finding oranges or lemons, covered with quantities of mold-spores, lying upon or just beneath the surface of the ground, from which they may be blown over the fruit with the dust.

It is not only the Navels that are thus endangered; but [fol. 20] these fruits are probably the only ones that commonly become rotten before they are picked. All the fruit in the orchard is liable to become affected after it is packed, as soon as the spores existing on its surface have an opportunity to germinate. It is particularly desirable, therefore, that in the orchard all decayed fruit be gathered and buried so deeply that it will not be turned up by the plow; or that it should be otherwise disposed of. This may be done by digging a deep hole every little distance in the orchard, and piling in the rotten fruit from adjacent trees. Another method would be to gather and compost decayed fruit, thus destroying the spores; in this way finally using the fruit for fertilization, as mentioned by Professor Hilgard in the paragraph below. Either method provides a safe and rapid means of disposing of the refuse fruit, which will certainly very materially decrease the amount of spores, and therefore the liability to rot.

The Fertilizing Value of Citrus Culls

In connection with the foregoing discussion of the cause and prevention of the rot of citrus fruits, it seems desirable to discuss a point very frequently mooted, viz., the fertilizing value of such culls. Since, from Professor Woodworth's investigations, it is clear that the culls are not merely useless, but a positive detriment if allowed to rot under the trees, as is commonly done, the question of their disposal raises that of their value in restoring the plant-food they have derived from the soil. It is clear that each fruit represents the ingredients which will be required to produce another in the future; and in accordance with the golden rule of returns to the soil, they should be given back. The question arises, however, as to the exact value represented, and the expense the grower can afford to go to save it, as against purchasing fertilizers in the market.

The ash-percentage of fresh citrus fruit is (in California) .43 per cent on the average. Analysis shows that of this amount about one-half is potash, while .053 per cent is phosphoric acid. Or, stated for 1,000 pounds of oranges, we have 2.11 pounds of potash, 1.25 pounds of phosphoric acid, and, besides, 1.83 pounds of nitrogen in the fresh fruit. Assigning to these ingredients their accepted commercial values for such conditions, we find the manurial value of the 1,000 pounds, aside from the humus, to be about 30 cents; it will not exceed 40 cents.

As an alternative of the deep burying recommended by Professor Woodworth in order to render the culls innocuous to the crop, I have heretofore suggested composting with lime and earth on special piles; the compost to be hauled out to the orchard after the complete decomposition of both fruit and mold-spores. Considering that the culls [fols. 21 & 22] are usually gathered into piles anyway, this would involve little outlay beyond that for lime; and for this purpose the spent lime from the beet-sugar factories would be available, provided it were sold at its true manurial value only, which is about $2.30 per ton in the moist condition, or $3 in the dry. When fresh lime is used it will be best to employ it in the unslaked condition, so that it will help to take up the moisture from the fruit. The compost thus produced would be a substantial addition to the productiveness of the grove. But each one must judge ac-

cording to his location, etc., whether this or the purchase of fertilizers would pay best. The tree roots would eventually find the pits in which the culls were buried; but to plow them in deep enough to prevent their being brought up by the plow afterward, would need the "master's eye." [E. W. H.]

[fol. 23] PLAINTIFFS' EXHIBIT No. 3

The Florida Agriculturist

Vol. XXXI, No. 39. Whole No. 1563

Jacksonville and DeLand, Fla., Wednesday, September 28, 1904

How to Prevent Decay of Our Citrus Fruits

This is a subject of the utmost importance to every grower of citrus fruits in the state. The Riverside Press and Horticulturist publishes a long address on the subject which gives some valuable suggestions.

(A practical paper read before the University Seaside Institute at Long Beach by T. J. Ashby of the Pasadena Lemon Growers' Association.)

This ten minute paper on the "Decay of Our Citrus Fruits" is written with the honest intent, that if possible, the outrageous losses by decay should be lessened if not largely stopped, and our smaller orchards placed on a practical and paying basis, with the maximum of profits and the minimum of loss. The methods of our best growers are known. It is worthy of our beautiful industry that so large a number of our growers do not as yet obtain similar success?

We have in our citrus trees practically the most responsive of all commercial growths, intelligent care winning out in beauty and profits, and all success well deserved.

I have seen a Redlands grower budding over a seemingly perfect navel orange tree because it did not bear 90 per cent firm clean skinned fancy fruit. The fruit of the tree condemned, he said, was too soft and rich, he could not control size or keeping qualities, hence he rebudded from a true that grew firm fleshed, clean skinned fruit. He set his price on

the orchard and sometime during the season he obtained it, for his fruit always packed to good sizes, had weight, color and carried like Valencias.

[fol. 24] If all our orchards had such fruit according to varieties would 30,000 cars be too much for California's output or any complaint heard of over-production?

We have some large lemon orchardists whose lemons store for months with slight loss, carry without icing, bring the top prices, are preferred to foreign fruit, and are sought for general excellence.

If California had 5,000 cars of such lemons, would the business be over-done?

Why do these gentlemen obtain deserved success, while other growers working perhaps as hard or harder, needing financial results more, do not in the hard, practical race for life, obtain it.

Is it in the man, in the orchard's location, in the color, in the flavor, in the general appearance of the fruit, or in the marketing? All of these are factors, especially the man, and much in the marketing. But the fundamental difference between success and failure lies in the carrying power of the fruit.

Not alone in the dead loss by decay; but that decay's influence on the methods of marketing. If fruit would carry like golf, tennis or croquet balls, they could be sold direct from the factory. If fruit would carry like wheat, it could be sold like wheat, for spot cash. But with the decay and loss now incident to the industry, no sane man can or will speculate on diseased conditions without figuring on its value when delivered at his point of sale. But if some of our growers as we have seen have largely eliminated those conditions, the large majority by the same methods, can and will.

For keeping qualities and desirable fruit we must begin with the nursery or gradually rebud what trees we have, using in either case only buds that we know come from such trees as we wish to reproduce. The apple orchardist is certainly in advance of us in his knowledge of varieties, and the reproduction of good keeping fruit—from the juicy and rapidly maturing Duchess of Oldenburg to the slow maturing Astrakan, the navel and Valencias of the apple [fol. 25] orchard. He is always on the lookout for better keepers and will regraft to that end. And as to his orchard

methods, whoever heard of one fertilizing and irrigating to rush his apples to early maturity and consequently to early decay, that sequence being another law of life.

He has long found out what we know and do not half practice, that the greatest care must be taken in handling the individual fruit and that the fumigation of warehouse and boxes is another factor in success. What is the use of the latest methods of deep culture and irrigation if we turn our carefully matured fruit into careless hands for picking, if personal care from bud to shipment attention, careful constant attention to detail from grove planting to fruit gathering and forwarding.

The elements of decay are ever present. The laws of life and death are eternal. No rest. Change is ever at work. The cut surface of an apple soon shows dark. There is an affinity of substances going on. Expose washing soda to the air, and you can soon scrape baking soda from its surface, bicarbonate of soda, oxygen ever taking up its part of carbon. If you expose citric acid, lemon drops, or acidulated candies, they soon become milky white or clouded. They oxydize. In them we thus see fruit acids are inclined to voluntary decomposition, and that exposure to the air is necessary. In damaged fruit, let the air be humid and we soon see the production of infusoria the supposed work bacteria of decomposition. The entire plant of the winery or vinegar manufactory turns to this process to procure its manufactured wines and vinegar. The handler of fresh fruits is working overtime to prevent it.

With a dry atmosphere and fit fruit he is comparatively safe, even then with bruised, abraised or chilled fruit he will have some loss, but as his hydrometer falls from dry to normal, then to moist, he knows the flying spores will germinate on moist surfaces and the darker work of coming purification (black rot) is at work in his heating box centers. We have not yet learned to fully combat it by the use of [fol. 26] chemical absorbents to create our own atmosphere to sterilize the trouble. Lime and other absorbents will aid. One per cent of vaporized formaldehyde to 100 cubic feet will materially lessen, but I think the use of an electric fan in a shaft from which a cotton hose goes to the center of things, will be the coming remedy.

Shall we face the percent of loss by decay in transit, decay that occurs after all our painstaking care, or lack of it?

The following tables tell the starting story, the story of handicap in selling your fruit, the shameful story of our negligence or lack of knowledge and the orchardist's crime against good merchandising.

I have interviewed men who are daily watching the market returns and their replies concerning an estimate of the season's rot runs from 12 1-2 to 16 per cent. As near an estimate as can be made based on the reports from several thousand cars, 23 1-2 per cent go through without loss, .03 per cent decay being allowed; 31 per cent go to auction with 14 3-4 per cent decay, and the rest run the per cent to 10 1-4 per cent decay. To place the percent of decay on the term of years figured on, figures from which there is no chance of cavil, I make my deductions from 8 per cent decay for all classes of citrus fruits for the past eight years.

To make the figures interesting, I place before you the actual amounts of shipments and sales brought into evidence in a recent inquiry. From September, 1896, to July of this season, 65,270 cars were sold for $53,302,617—average $818.65 per car. The cost of selling was .038 cents per box which makes the per cent of selling .0168. The financial losses during that period were $13,620.17 or only twenty-five dollars on the hundred thousand. The average loss by decay on fruit furnished the salesmen, we see is about eight per cent. Growers furnishing the decay.

This means, throwing the financial loss and expenses into percentage and for illustration tree planting out of every 100,000 trees planted on 1,000 acres the loss was only 25 [fols. 27-30] trees in planting the entire acreage and the cost of planting was only at the rate of .0168 cents per 100 trees. This with poor stock 8,000 trees proving worthless. I am familiar with the losses and running expenses of the wholesale grocery business, and if any wholesale dealer is present he will confirm me in stating that if losses and expenses were as light as the above and sales as great he could retire in two or three years.

To return to figures. Of the 65,270 cars sold, you furnished 1 in 1 1-2 cars decays the average sale per car for the series of eight seasons was $816.64—8 per cent loss by decay per car 65.33 and the selling value handicapped. Eight per cent loss on the eight seasons 65,720 cars at 65.33 over 4 1-4 million dollars. No leak in running expenses, no leak in bad debts, but $4,264,209.63 deficit in your business

and the exchange furnishing only half the fruit, twice that, if not more in the last eight seasons' citrus industry of California. Eight and one-quarter millions, a million a year. Of this year's business nearly 28,000 cars say only average $500 a car being a bad season, 10 per cent decay makes $1,400,000 loss. Do we like these figures, so plain, so true, so severe on our intelligence and business ability? I leave the solution to you.

Three points I would like to see brought out in this discussion to help stop this wasteful decay in fruit:

In relation to selecting bids for nursery stock and rebudding from the fruit bearing limbs of fit trees; instead of from so many suckers, as has been instanced in olive and citrus tree reproduction.

Second. In relation to these methods in the orchard that prove available in retarding rather than forcing our fruit to maturity against the well known law of "quick growth—early decay," and

Third. In relation to those methods of gathering, handling, storing, packing and forwarding that conserve the life and render the fruit less liable to abuse and injury.

[fol. 31] PLAINTIFFS' EXHIBIT NO. 4

Citrus Fruits and Their Culture

By H. Harold Hume,

Professor of Horticulture and Botany in the University of Florida

Horticulturist and Botanist of the Florida Agricultural Experiment Station

Jacksonville, Florida

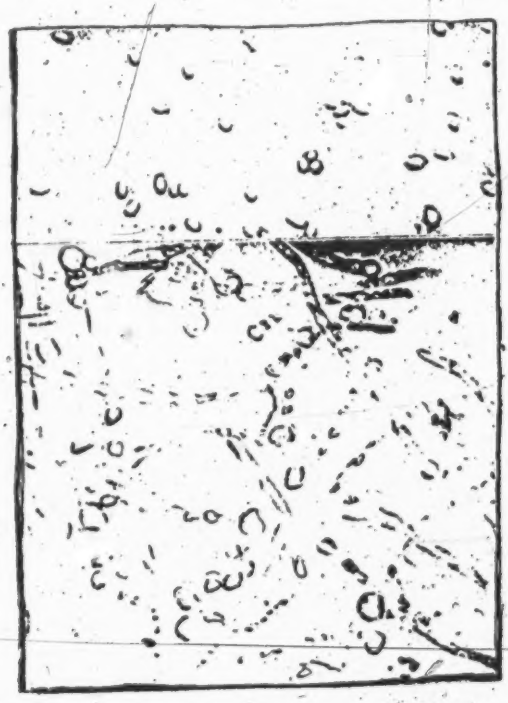
The H. & W. B. Drew Company. 1904

[fol. 32] Treatment.—The disease can be held in check by spraying with Bordeaux mixture or ammoniacal solution.

Fig. 102. Leaf-spot fungus on pomelo leaves. The light areas are the spots affected.

Ripe-rot of Citrus Fruits. Frequently ripe specimens of citrus fruits, more particularly, perhaps, oranges and lemons, show a yellow covering of dusk-like, bluish powder. If observed in an earlier stage, the area will be whitish, instead of bluish, later the whole fruit ball becomes small and shriveled and the powdery substance occupies a relatively larger space.

The rotting of the fruit is caused by a fungus, Penicillium Italicum, closely allied to the common blue mold which forms on bread, and the powdery mass is composed of innumerable spores. The white coating of the fruit, on some injured spot, is the "mycelium," the vegetative part, which bears the same relation to the fungus that the roots do to a higher plant. The mycelium grows into and through the tissue of the fruit. After developing for some time and reaching a certain stage of growth, the fungus forms spores. These are visible as the bluish, powdery moss. The spores are joined together in the early stages in bead-like strings. As they become matured, they break off and blow away. [fol. 33] They are thin walled and oval in outline. The upper portion of Fig. 103 shows a number of these spores much



Micro-photograph by Miss L. McCulloch

Fig. 103. Spores of Ripe-rot fungus above, germinating spores below, greatly enlarged

enlarged. The spores are blown about by the wind and fall upon the fruit. There in the presence of moisture they start to grow, as shown in the lower half of Fig. 103. A slender tube is sent out which continues to lengthen. If it can find an entrance into the fruit it grows and develops, forming a mycelium, and spores are again soon produced.

Certain weather conditions are particularly favorable to the disease. Hot, damp days and nights are ideal for the growth of the fungus, while cold, dry weather does not favor its development.

The disease most frequently gains access to the fruit in some injured spot. A slight bruise is sufficient. Insects puncture the rind and give a chance for it to enter. If fruit is improperly cured and tightly packed into the boxes, it [fol. 34] may be injured and the fungus have a chance to attack the fruit, most usually developing where two are pressed closely in contact. In the field it frequently attacks fruits hanging together on the trees and causes considerable

damage. In California, Woodworth reports the entrance of the fungus through the navel end of the Bahia orange as being quite common.

Treatment. Fruit should be carefully handled and packed. The fruit should be thoroughly cured and dry when packed. Carefully wrap the fruit, using a good quality of paper, one not readily affected by moisture. This will prevent the spread of the disease from one fruit to another in the box. If the spores of the fungus have become abundant in the packing house, it should be tightly closed and fumigated by burning sulphur in it. Plenty should be used. Thorough ventilation of the packing house will assist materially. Cull fruit should not be left about to rot and decay. Decayed fruit should be destroyed, preferably by burning.

Sooty-mold. Meliola Camellin (Catt.) Sacc., is widely distributed throughout the different sections where citrus fruits are grown. It occurs as a sooty-black covering on the leaves, fruits and twigs of many plants, and is intimately associated with various insects belonging to the families Aleyrodida Coccida and Aphididæ. In Florida is follows Lecanlum olea on Varium olcander and Persea Carollnensis. Aphis gossupii on the orange, eggplant, and many other herbs, shrubs and trees; Lecanium hesperidium, Ceroplates docidensis, Icerya purchasi, Alleyrodes citri and other insects on citrus trees. In short, it may be said that it is found with all the scale and allied insects which exude honey dew in any considerable quantities.

[fol. 35] PLAINTIFFS' EXHIBIT NO. 5

California Cultivator

Los Angeles April 14, 1905 San Francisco

Causes of Citrus Fruit Decay

Paper Read Before the Riverside Farmers' Institute by C. Harold Powell, Pomologist in Charge of U. S. Fruit Decay Investigations

The United States Department of Agriculture has begun an investigation of the methods of handling the citrus fruits

in the groves, the packing houses and in transit with a view to determining the relation of these methods to the shipping and the keeping quality of the fruit. The investigation was undertaken as a result of repeated requests by individuals and organizations in the citrus industry of Califorina. The movement was started by your fellow townsman, Mr. J. H. Reed, and to his persistent efforts more than to anyone else has the department been led to consider this work a proper part of its experimental problems.

The investigation was begun about the first of the present year, and is only well under way. We refer to it at this stage with some hesitation, knowing that not more than a preliminary statement of its scope can be made. The department has followed investigations in similar lines in the apple, pear and peach industries for several years, and as the keeping qualities of all fruits are governed by the same general principles, we can speak more confidently of some phases of the citrus industry than we could if this was a pioneer movement.

The shipping and keeping quality of a fruit is the result of the conditions under which it is grown, coupled with the conditions under which it is handled after it leaves the tree. [fol. 36] The nature of the soil, the general care of the orchard or grove, including the fertilization, tillage, cover cropping, irrigation and pruning, the age and condition of the trees and the general location of the plantation, modify the tree and fruit profoundly, and produce the widest variation in the behavior of the fruit in transit, in the market or in storage.

The relation of the cultural side of fruit growing to the shipping and keeping of the fruit is not well understood. The department is not in a position to consider this phase of the citrus industry in its experimental work, though its importance is fully recognized. The researches of the college of agriculture at Berkeley now under way and the future work of the new Citrus Experiment Station must eventually throw light on some of the perplexing problems that accompany the production of citrus fruits of the highest quality.

Our investigations begin with the fruit as it leaves the tree and follow it to the consumer. We hope to find out whether the common storage and transportation decays and other evidences of poor keeping quality are connected with the

methods of picking the fruit or handling it otherwise from the grove to the packing house; whether the methods in the packing house, the brushing and other forms of mechanical treatment, the curing, the sanitary conditions surrounding it, the type of package, and the conditions in transit have anything to do with the condition in which the fruit reaches the distant market. This is not a pathological or citrus disease investigation. It aims incidentally to determine the influence of commercial methods on the development of diseases well understood, but primarily to determine the general factors which lead to improvement in the handling of a great fruit industry.

Most of the packing house and transportation decays in both oranges and lemons are caused by the common blue [fol. 37] molds. These fungi grow profusely in the moist, moderate temperature. The growth is checked in dry air, and in low temperatures their development is retarded. The molds grow slowly in the lowest temperatures in which the fruit may be safely stored without freezing. These molds seldom attack a perfect, healthy fruit. They seldom gain entrance through a skin that is not injured or that is not physiologically weak.

We do not know much about the causes of physiological weaknesses in citrus fruits, i. e., why an uninjured orange is more susceptible to decay than another, but we are finding out some of the causes of mechanical injury. These injuries more than all other factors combined are the direct cause of decay in citrus fruits. When an orange or lemon has the skin broken, the blue mold finds access to the wound and if there is sufficient moisture and a temperature high enough to start it, decay is the inevitable result.

As it is our aim to study the methods of handling the orange from the time it is picked from the tree we begin with the clipping of the fruit from the branch. After examining hundreds of boxes in the most representative orange sections in the State, it is safe to say that 15 to 20 per cent of all fruit is made susceptible to rot by puncturing or shaving the skin with the clippers.

The following shows the percentage of clipper cut fruit in the boxes from 25 representative groves scattered throughout the citrus belt:

Per cent: 29.0; 22.5; 11.9; 28.3; 18.8; 4.2; 24.1; 24.0; 15.7; 16.4; 13.1; 24.4; 11.0; 28.0; 8.0; 3.0; 24.0; 35.0; 12.0; 17.7; 10.6; 21.0; 11.4; 2.5; 2.6.

Average, 16.9 per cent.

This means that by the one operation of picking the orange picker handicaps about one-sixth of the orange crop before [fol. 38] it enters a packing house or a car. All of the injured oranges, of course, do not decay. Only those that become inoculated with the spores of the blue mold, and are afterwards placed in favorable conditions of moisture and temperature develop the disease.

The following table, made up from nine representative experiments with oranges carefully handled, in comparison with clipper-cut oranges, indicate that more than a third of these cuts may develop decay under favorable conditions:

Decay in clipper-cut fruits. Temperature 70 degrees and air moist:

Free from cuts: 0.0 per cent decay; 1.7; 1.3; 3.8; 1.0; 4.7; 5.3; 1.6; 3.5.

Fruit cut: 18.0 per cent decay; 74.0; 56.0; 38.0; 12.7; 48.0; 29.0; 10.4.

Average, free from cuts, 2.5 per cent; fruit cut, 36.9 per cent.

The striking feature of the second table above, aside from the extent of the clipper injury, is the wide variation in the amount of injured fruit coming from different groves into the same packing house. A grower whose fruit shows 4 per cent injury may be pooling with another whose oranges show more than 30 per cent.

An equally wide variation is commonly found in the fruit of different men picking in the same grove, as will be seen from the following table taken at random from a large number of similar records. The figures show the percentage of clipper-cut fruit in different boxes in a load of fruit.

Clipper-cut fruit of different pickers:

Per cent: 38.0; 17.0; 18.0; 38.0; 33.0; 21.0; 32.0; 16.0; 13.0; 15.0; 72.0; 50.0; 16.0; 42.0; 29.0; 9.0; 7.0; 17.0.

[fol. 39] Another form of injury that originates in picking results from cutting the stems long. A long stem may

puncture a number of oranges as it passes along the route from the tree to the packing box, though the injury from this source has been greatly overestimated. A stem-punctured orange is likely to rot under favorable conditions, but the actual loss from stem puncturing is probably not greater than 1 in 25 in comparison with the losses from clipper cutting.

The following table shows the proportions of oranges from ten groves with stems long enough to do injury:

Per cent: 5.6; 6.1; 6.0; 6.9; 17.0; 14.0; 34.0; 11.0; 31.0; 30.6.

Average, 16.1 per cent.

At the high rate of speed at which the average packing house is run, probably not 2 per cent of the clipper-cut fruit is detected or thrown out by the graders as it passes through the machinery. A large amount of fruit has been examined in the bins and in the boxes already packed to determine how much clipper-cut fruit actually goes into the packed boxes. An indication of the amount will be found in the following representative figures compiled in a dozen or more houses.

Clipper-cut fruit in bins and packed boxes:

14.0 per cent in 126s fancy.
37.0 per cent in 112s fancy.
11.0 per cent in 126s fancy.
11.0 per cent in 126s extra fancy.
26.4 per cent in 80s fancy.
20.0 per cent in 96s fancy.
10.0 per cent in 126s fancy.
11.0 per cent in 150s fancy.
31.0 per cent in 126s choice.

The fruit in a number of cars has been examined in the East to determine what proportion of the decay begins at [fol. 40] the stem end, on the body of the fruit and at the navel end of the orange. Many of the oranges are decayed completely on arrival, making the origin uncertain.

The variations in the amount of injured fruit from different groves throws some light on the different amounts of decay in cars of the same grade going to the same market, the fruit having been packed the same or on successive days in one packing house. It is not unusual for the agent in the

East to report 5 per cent decay on one car and 20 per cent or more on another. No other result should be expected where the fruit that is packed one day shows five or six times as much mechanical injury as the other. There is no inconsistency in such reports, assuming, of course, that they are honestly made.

For similar reasons the variation in the amount of injured fruit in different packed boxes explains why an agent at St. Louis may honestly report 20 per cent decay in a car, while the agent in New York reports only 5 per cent in the same car. Each may have examined different boxes.

The discrepancies in agents' reports like the one just noted have usually been charged to the carelessness of the agent making the first report, but variations of this nature are the logical outcome of starting fruit to the East that differs widely in its susceptibility to rot.

There has not been time to investigate other kinds of mechanical injury in the groves. We have seen the fruit dropped like lead into the bags at a distance of 4 or 5 feet, the boxes are often too full, the loaders are sometimes careless, and the gravel in the bottom of the boxes frequently pushes through the skin and makes an entrance for the rot. Neither has there been time to investigate many of the forms of injury in the packing houses. We have, however, some suggestive data on the influence of brushing the fruit on the [fol. 41] development of decay. The following figures are taken from 16 tests in comparing brushed and unbrushed fruit. They indicate that the brush may increase the decay to a considerable extent.

Decay in brushed and unbrushed fruit: Not brushed: 0.0; 4.7; 1.0; 1.3; 2.6; 1.7; 1.5; 3.7; 3.7; 4.7; 3.7; 3.7; 1.7; 3.6; 1.6; 1.6.

Brushed: 18.0; 8.3; 1.0; 8.3; 8.2; 10.6; 11.3; 22.0; 20.9; 8.8; 22.0; 20.9; 8.5; 7.1; 5.4; 18.0.

Average not brushed, 2.5 per cent.

Average brushed, 12.4 per cent.

We are not sure whether the brush generally injures the oranges mechanically and thereby makes them susceptible to decay, or whether the increase is due to the inoculation of injured parts of the oranges by the spores on the bristles of a brush. The decay in the same lot of fruit may be raised or lowered from 10 to 30 per cent or more by closing or

opening the same brush. The brush is always full of mold spores. The air is full of them. The oranges are covered with them as they pass through the brush, and in spite of the most careful vigilance exercised in the average packing house, rotten oranges are constantly passing through the brushes. If the oranges are clipper-cut or injured in any other way, the brush is likely to deposit a spore in these bruised places.

We are shipping large quantities of fruit to Eastern markets to determine the influence of various methods of handling it on the shipping quality. It is too early to make a report on these shipments, as they are only beginning to arrive at this time. The shipments should throw more light on the best ways to handle puffed fruit, on the effect of picking and packing house methods on carrying qualities, on the influence of the type of package, on the behavior of the fruit, on shipping under ventilation and under ice.

[fol. 42] It is not our aim to discuss transportation problems in detail at this meeting, but there are some features of it that we desire to bring to your attention. A large proportion of the commercial losses in the cold storage of fruits is the result of delaying the cooling of the fruit after it is picked. As soon as a fruit is picked the ripening processes spring forward with a bound, and the diseases spread rapidly. Delaying the fruit in the orchards, in the packing houses, in transit or in any other condition in war weather, gives the fruit a chance to ripen and the various diseases an opportunity to spread. On the other hand, when the temperature of the fruit is reduced quickly, both the ripening and the growth of diseases are retarded.

We are endeavoring to find out whether the cooling of the fruit before shipment will have a similar effect on retarding the decays in oranges in transit. Probably a dozen cars of fruit will be forwarded under these conditions with an equal number of cars under ordinary icing. The orange is in transit two weeks or more in going across the continent, and the diseases may have an opportunity to grow in that length of time. We have had enough experience to feel sure that the orange can be placed in any market in the country in prime condition if it is shipped quickly after picking in a cold condition. But we are not so sanguine about the result

where the fruit stands in a packing house several days before packing and cooling.

Nearly all packing houses hold the fruit several days to wilt it. The wilting makes the fruit pack easier and probably does no harm to perfect oranges. The molds, however, start in warm weather in the injured fruit during the curing, after which no treatment that we know of can retard its growth. We know from the reports on several shipments that cut fruit can be laid down in New York with not [fol. 43] more than 5 per cent decay where the fruit is loaded in a refrigerator car quickly after the injury has been made, but if the oranges are delayed several days in the packing house, it is probable that no degree of cooling that could be maintained by a refrigerator car would wholly eliminate the trouble.

The fruit storage investigations of the department have emphasized repeatedly the necessity of quickly storing the fruit after picking in warm weather, in order to check both the ripening and the growth of rots. The following table indicates that the same principle applies with equal force to the handling of the orange for shipment. The table illustrates the effect of delaying the storage of oranges for different lengths of time after the fruit has been inoculated with blue mold. The oranges were stored in a temperature of 32 degrees Fahrenheit, and the record of decay made 10 days after.

Immediate storage	0.0 decay
27 hours delay	0.0 decay
52 hours delay	15.5 decay
94 hours delay	75.5 decay

From this data and the experience in fruit storage we have no hesitation in saying that oranges ought to be packed in the quicket possible time where they are to be shipped in warm weather under ice.

There is danger in the use of cold methods of fruit shipment that we desire to emphasize. The cold temperatures do not harm the perfect fruit either in eating quality or in keeping quality after it is removed to a warmer air. It may retard the development of decay in injured oranges so that they arrive in the East in apparently prime condition.

But the decay is only retarded. As soon as the oranges are exposed to warm air, moisture is condensed upon them, the spores germinate, and in a few days the fruit that would have rotted in transit is decaying on the hands of the re- [fol. 44] tailer or the consumer. Cold temperatures should never take the place of careful handling. If a colder temperature than is used now should retard the development of decay while the fruit is crossing the continent, there is danger that the care in the picking and packing house methods would be relaxed. One result would inevitably follow this course. A cry would arise from the retailer and the consumer that California oranges have poor keeping quality. Cold storage fruit keeps as well as any other when removed to a warm air, provided the fruit is in good physical condition. When cold storage fruit decays quickly the trouble is generally with the fruit, not with the cold storage.

We do not care to draw any conclusions from the data presented. This report should be looked upon as a preliminary report on the investigation. The department hopes to continue the work several years, after which a final report will be rendered.

In closing I desire to express the appreciation of the Department of Agriculture for the hearty co-operation extended by everyone interested and connected with the citrus industry. Every facility has been freely offered for observation and experimentation in the houses of the Southern California Fruit Exchange, the Citrus Union and the independent shippers. No less efficient has been the co-operation of the growers. The fruit in the shipping experiments will go forward in cars in which the value of the fruit will not be less than $15,000. The exchange has assumed all responsibility on the final condition of the fruit. The Southern Pacific and Santa Fe railroads are drawing the cars of fruit that are specially handled to any part of the State we designate without charge. The Los Angeles Ice & Cold Storage Company is cooling at least ten cars of fruit before shipping, without charge.

In our experience in experimental work, we have never seen a more efficient co-operation between practical business [fols. 45 & 46] industry and scientific research. We have faith to believe that an industry that is ready to co-operate

with science to this extent will be able to apply the results of the investigation in whatever direction they may lead.

[fol. 47] Plaintiff's Exhibit No. 6

The Handling of Fruit for Transportation

By G. Harold Powell, Pomologist in Charge of Fruit Transportation and Storage Investigations, Bureau of Plant Industry

[Reprint from Yearbook of Department of Agriculture for 1905]

[fol. 48] Contents

Introduction	49
Recent growth of certain phases of the fruit industry	49
The hazardous nature of fruit shipping	50
Causes of losses in transit	51
Fungous diseases	51
Contact injuries	52
Careless handling	52
The extent of mechanical injuries	56
The present methods of handling	57
Factors that influence keeping quality	58
Conditions in a refrigerator car	59
The need of improvement in transportation facilities	60
Methods of reducing the temperature of fruit for shipment	60
Cooling in cold-storage houses	61
Cooling in cars from a cold-storage plant	63
Cooling in cars with a fan	63
Time required for cooling fruit	64
Other advantages of cooling fruit for shipment	64
Conclusion	65

Illustrations

Plates

Plate XXXIV. Decay in the lemon and orange as the result of cuts from clippers 53
XXXV. Decay in apples resulting from mechanical bruising and from codling moth injury 54
XXXVI. Fig. 1.—Careless piling of peaches. Fig. 2.—Orange packing house, California 55
XXXVII. Fig. 1.—Cooling oranges in car, Los Angeles, Cal. Fig. 2.—Cooling bananas in cars, Springfield, Mo. 62

[fol. 49] The Handling of Fruit for Transportation

By G. Harold Powell, Pomologist in Charge of Fruit Transportation and Storage Investigations, Bureau of Plant Industry

Introduction

The fruit-growing and the transportation interests of the country are inseparably bound together. There is no use in growing apples, oranges, or peaches commercially without an efficient system of safe and rapid distribution. The intricate system of railroads and waterways that spreads out like a network over the country has converted vast areas of unproductive land into highly specialized fruit-growing regions, and distributes the products of the orchard, the plantation, and the vineyard to the remotest parts of the country and to many foreign markets. There has been a gradual evolution of special transportation facilities from the box car, the pony refrigerators, and the slow express or boat service, with their irregular schedules, of forty years ago. The fast fruit-train service, the fruit-express car, the refrigerator-car lines, the special fruit boats, the refrigerator compartments on shipboard, and the development of cold-storage warehouses as a link in the chain of distribution have brought together the producer and the consumer in the most distant parts of the United States and Canada. They have made accessible

to the American fruit grower the principal markets of Europe, of Asia, and of other foreign lands.

Recent Growth of Certain Phases of the Fruit Industry

The citrus fruit business of California is a striking example of a large commercial industry that has grown up within thirty years. The first carload of 300 boxes of oranges is said to have been shipped from the State in 1876. The shipments reached 1,000 cars ten years later, in 1886. A decade afterwards, in 1896, nearly 16,000 cars were forwarded, while about 30,000 carloads of oranges and lemons, amounting to over 10,000,000 boxes of fruit, valued in California at $27,000,000, were shipped during the forwarding season of 1904-5, the fruit reaching every town of importance in the United States and Canada, as well as many European and other foreign markets.

[fol. 50] The deciduous-fruit industry of California has also shown a remarkable development. The first carload of fresh fruit was shipped East in 1869. The fresh-fruit shipments in 1895 amounted to 4,568 carloads, while in 1905 between 8,000 and 10,000 cars were shipped from the State, many of the apples, pears, plums, and peaches finding their way across the Atlantic and the Pacific as well.

The western coast has not been alone in the rapid development of commercial fruit growing. About fifteen years ago strawberry culture began to develop as an important commercial industry in North Carolina and South Carolina. In 1897 the marketed crop reached about 500 carloads, while in 1905 it was between four and five times as large. Peach growing in Georgia is another example of the rapid development of an American fruit industry. About thirty years ago a few peaches were shipped from the State by express. The refrigerator chests devised in 1866 by Mr. Parker Earle for the shipment of strawberries were used in Georgia as early as 1878 to prevent the rots and overripeness of peaches in transit. Two years later some of the crop was forwarded to Savannah by freight and thence in refrigerator compartments by boat to New York. About 1882, crude forms of the refrigerator car were introduced for the carrying of the fruit. The Elberta peach, which originated at Marshallville, Ga., came into prominence in the early eighties, giving the industry a great impetus, which has resulted in the growth of the shipments in the

last ten years from about 700 to 5,000 cars of fruit anually. The Georgia peach orchards represent now nearly 20,000,000 trees. The distribution of the fruit crop from these widely separated areas is one of the most difficult problems in transportation.

The Hazardous Nature of Fruit Shipping

No commodity is more likely to deteriorate in transit than the fruit crop. The ripening and the rots continue to develop in the cars in hot, moist seasons unless they are checked by a cold temperature soon after picking. Summer fruits, like the cherry, the peach, the plum, or the berries of different kinds, are likely to reach the market soft and decaying unless handled under the most favorable conditions. It is not uncommon to find the markets filled with overripe peaches from Texas, Georgia, or Michigan, or strawberries from the Carolina district, during hot, moist shipping seasons. The Bartlett pear often reaches the distant market in a "slack" condition on account of the ripening and shrinkage of the fruit in transit. The slow-ripening fall or winter fruits are less likely to develop troubles in transit, but on long trips the ripening processes may bring them to the point of deterioration, or the develop-[fol. 51] ment of rots may cause serious commercial loss.

Causes of Losses in Transit

The reader should distinguish between the losses that result from the continued ripening of the fruit and the deterioration from decay which the fruit may have contracted while growing or after it is picked. Either of these factors, or both of them working together, may be responsible for transportation troubles.

Fungous Diseases

Many of the diseases that attack the growth fruit continue to develop in transit. The bitter-rot is one of the worst apple diseases in the central-western and eastern-southern apple-growing States. The disease is often in an early stage of development when the apples are packed for shipment. It develops with great rapidity in the moist, warm air of the package and renders the fruit worthless

in a few days unless it is shipped or stored immediately after picking in a temperature as low as 40° F. It grows luxuriantly in warm weather if the shipping is delayed, or if the apples are forwarded in warm cars. The scab may grow slightly in transit, but the most serious result from shipping scabby apples follows the growth of the blue mold and the pink mold or rot in the tissue around the diseased spots. These secondary troubles grow rapidly if the fruit is warm and moist in transit, but are retarded by cold temperatures, the former disease growing very slowly in a temperature as low as 32° F., the latter not developing when the temperature drops to 40° F.

The monilia or brown-rot of the peach, a serious transportation trouble, may attack the fruit before or after it is picked. The peach is especially susceptible in warm, moist seasons, when the early varieties may decay badly on the trees. The disease grows with astonishing rapidity, a small point of infection developing into a spot as large as a quarter of a dollar in twenty-four hours in warm weather. Delaying the shipping of the fruit a few hours, or shipping it without thorough icing and ventilation in transit, is invariably followed by a large amount of decay. This rot is most severe in the comparatively warm, moist air in the top tiers of packages in a refrigerator car. There may be none of the trouble in the cooler, bottom tiers of packages. This condition in the different parts of a car leads to the conclusion that the monilia and the overripeness can both be controlled in transit when all of the fruit is cooled as quickly as the bottom tiers of packages.

The diseases that affect the fruit after picking cause the most serious losses in transit. The molds of various kinds, [fol. 52] such as Penicillium, Mucor, Aspergillus, and Botrytu probably cause more losses in transit and in fruits in cold storage than all other diseases combined. The blue molds (Penicillium), shown in Plates XXXIV and XXXV, produce the principal rots in apples and pears in storage and in transit, and in oranges and lemons in transit. These molds do not usually penetrate the uninjured surface of thick-skinned fruits like the orange, the lemon, the apple, or the pear. The delicate fruits, like the strawberry, are more easily attacked by a mold like Botrytus. The molds attack all fruits more readily when their vital processes are at low ebb from overripeness or from any

PLATE XXXIV

PLATE XXXV

FIG. 1.—CARELESS PILING OF PEACHES. FRUIT IS OFTEN INJURED IN THIS WAY.

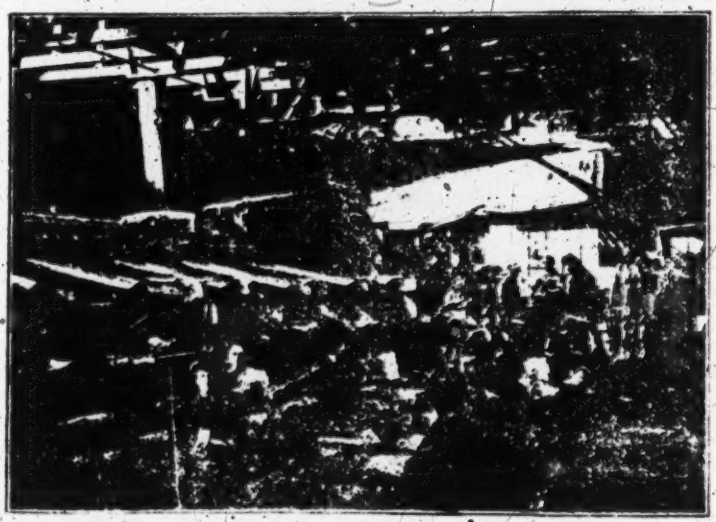


FIG. 2.—ORANGE PACKING HOUSE, CALIFORNIA, SHOWING COMPLICATED MACHINERY.

other cause, but they gain entrance to a fruit commonly when a spore comes in contact with a broken part of the skin, the disease growing rapidly if there is sufficient moisture with a temperature high enough to start it.

These diseases grow luxuriantly in warm, moist air. The limits of temperature in which they will grow are not well understood. Some of the blue molds probably grow at the freezing point of water, though slowly at a temperature below 40° F. If the fruit remains in the orchard in warm weather after picking the molds develop rapidly in injured fruit.

Contact Injuries

Another type of injury is due to packing the fruit so loosely that it moves in the package in transit, or to severe pressing, or to rubbing the fruit in any way. This injury is apparent on arrival in market. It frequently shows in brown, discolored spots on the Yellow Newtown apple or on the Wickson plum when the latter comes in contact with the package. It is primarily a packing difficulty that may be overcome by wrapping the fruit and by packing it more carefully.

Careless Handling

The care with which a fruit is handled in the orchard or plantation and in the packing house is one of the important factors in determining the shipping quality. It is the one factor above all others that keeps the thick-skinned fruits, like the orange or the apple, immune from the attacks of the common molds. These fruits do not often decay as long as the skin is whole, unless they are weakened by overripeness or by other adverse conditions. The least abrasion or cut in the skin gives the molds a foothold, and once started the decay is likely to continue under the most favorable transportation conditions.

It is equally important that soft-fleshed fruits, like the strawberry and the raspberry, be protected from injury. No fruit is more difficult to transport than a ripe strawberry; yet it can be shipped long distances and arrive in perfect condition under efficient refrigeration if the surface of the berry is intact.

(Here follow pages 53, 54, and 55.)

[fol. 56] The Extent of Mechanical Injuries

It is well known that decay in fruit in transit and in storage generally develops from a wound on the surface, though few persons know how common these injuries are. The commonest injuries are caused by the punctures of insects, by the stem of one fruit penetrating another, by cuts from the finger-nails of the handler, by dropping the fruit on a sharp surface, by ruptures caused by the rapid growth of the fruit, by windstorms, or by cutting the surface in some way. In Plate XXXV, figure 1, decay is shown starting from a cut on the surface of an apple; in the lower figure decay occurs around a codling-moth injury. Decay from clipper cuts in the lemon and orange is shown in Plate XXXIV, figure 1.

There has been a gradual improvement since the beginning of the fruit business in the methods of handling the crop. The early, crude manner of harvesting and packing is giving way to better methods in the orchard and in the packing houses. There needs to be further improvement along these lines in every branch of the fruit industry. In the apple industry, for example, where the crop is handled with more than average care, 10 per cent of the fruit is frequently made susceptible to decay by stem punctures caused by dropping the fruit roughly into the basket, on the sorting pile or table, or into the shipping package. A package of peaches will reveal a greater number of bruises, the trouble arising from the tearing of the skin in pulling the fruit from the stem, from packing it so firmly as to squeeze the fruit against the edges of the package, and from the pressure of the fingers of the picker; and, in addition to these causes, many injuries are the result of the rough handling of the packages in the orchards, in the packing houses, and in loading them in the cars. The softer fruits, like the strawberry, are damaged in the ordinary course of handling to a still greater degree.

None of the thick-skinned fruits is injured in handling more than the orange. The orange is not picked like an apple or a pear by separating it from the fruit spur. The fruit is attached firmly to the branch, from which it must be cut off with shears or clippers to prevent tearing the skin around the stem. In a variety like the Washington Navel, having a distinct cavity at the base, the picker often

sticks the clippers into the edge of the cavity beyond the stem, especially if a sharp-pointed pair of shears is used. If the stem is cut too short, the skin may be shaved with the clippers, or if too long, the stem may puncture another orange with which it comes in contact. If the fruit is packed in a house equipped with machinery, the chances for bruising are further increased.

Until recently, when the attention of the grower and packer was directed to these injuries, it was difficult to find [fol. 57] a box in which 10 per cent of the fruit had not been mechanically bruised. The injury from clipper-cuts alone may vary from 5 to 50 per cent. In addition, the oranges may have been injured by stem punctures or by the finger-nails of the picker, and still more bruising occurs in the field in dropping the fruit roughly into boxes, bags, or baskets, by filling boxes too full, or by throwing the packages carelessly on or off the wagon. An easy method of injuring the peach in the piling of the packages is shown in Plate XXXVI, figure 1.

It is more difficult to locate the cause of injury in packing the fruit. There is a wide variation in the equipment and management of packing houses and in the care exercised in packing the fruit in the field. In machine-equipped packing houses these troubles are likely to result from an apparently trifling disarrangement of some part of the machinery. In an orange or lemon packing house the fruit may be cut or scratched by a wire that projects from a brush, by a nail protruding in a runway, by a sharp corner exposed without padding, or by some other mechanical defect. Ten per cent or more of the peaches or plums in a package often have the skin broken by the sharp edges of the baskets or boxes, especially when the fruit extends above the package. A similar amount of injury may result in covering the packages with undue pressure or in dropping the fruit in some part of the packing operation. A packing house equipped with complicated machinery like the orange house shown in Plate XXXVI, figure 2, is likely to injure the fruit.

The Present Methods of Handling

Few experienced fruit handlers realize how much the fruit is injured in the orchards, plantations, and packing houses. The fruit shipper is likely to seek an explanation of the

losses in transit in factors other than the condition of the fruit when it is shipped. This phase of the fruit business is one that needs to be made more prominent and which requires a determined effort to improve. An efficient labor foreman who appreciates the nature of these troubles can reduce to a minimum such bruises as result from the dropping of an apple or a peach or from the clipping of an orange. The writer has seen an average injury of 20 per cent of the oranges in a grove in which more than 100 men were employed reduced to 5 per cent in a few days by the persistent efforts of a competent foreman, with an additional cost of less than one-half cent a box for the more careful picking.

The responsibility for rough handling may often lie back of the individual picker or packer. It is often the result of the system of handling the labor and the fruit in the plantations and packing houses. The fruit-growing business has not yet developed to that point where every picker or packer is held responsible for the quality of his work. No two [fol. 58] persons handle the fruit with equal care. One orange picker, for example, may cut 1 per cent of the fruit in picking, while another injures from 50 to 75 per cent. One leaves 5 per cent with stems too long; another, 50 per cent. A careful apple picker or a peach picker may not injure 2 per cent of the fruit by pinching it, while a clumsy-handed picker may bruise 90 per cent.

These differences are common rather than unusual. They may be overcome to a large extent by the persistent effort of those in charge of labor, but a system by which the fruit of every picker or packer can be identified might be adopted in order that the persistently careless worker may be eliminated. If the picker and the packer each places a number, or a numbered ticket, on the package when the fruit leaves his hands, an inspector is able to trace the fruit to the one who is responsible for the handling. An efficient system of inspection of the work in the plantations and packing houses is an essential feature of the organization of a large fruit business. In cases like the California orange industry, where the growers of a community may pool the fruit, the inspection of the work of the individual picker by the grower and of the fruit of each grower by the management of the packing house is necessary to prevent an injustice to a care-

ful handler who may otherwise pool his fruit with oranges showing a large amount of injury.

Another prolific cause of careless handling in the orchards and packing houses comes from paying the labor by a package rate, without inspecting the work of the individual. Under these conditions, the quantity rather than the quality of the work is the prime consideration of the picker or packer, and it oftens leads to the most flagrant carelessness. If the work of the individual can be traced by an inspection system, this method of fruit handling is less objectionable.

Factors That Influence Keeping Quality

A cold, dry, pure air is ideal for the preservation of fruits of most kinds. Cold air checks the ripening processes and retards the growth of diseases. Dry air may prevent the development of rots, and pure air preserves the delicate quality of the fruit. The ripeninb must be checked soon after the fruit is picked to prevent premature deterioration. Ripening proceeds much more rapidly when a fruit is severed from the tree, so that it comes nearer the point of deterioration in a few hours or days than it would have been if left hanging on the tree in the same temperature for a much longer period. In cold storage the rots develop and most fruits ripen if the temperature remains much above 32° F. for any length of time. The molds grow if the room is moist; the flavor deteriorates if the air is impure. If the temperature throughout the room is not uniform, the stored products ripen unevenly. If the products [fol. 59] are not piled so that the air can circulate freely about the packages, the ripening may proceed and the rots develop before the fruit is cooled.

The behavior of products in cold storage depends on their condition when stored, as well as on the conditions in the storage house. If fruit is bruised and susceptible to rot, the molds that grow in low temperatures cause it to decay early in the storage season. It it ripens or diseases develop during delays in storing, the fruit breaks down prematurely; or, if the packages are large and radiate the heat slowly, the fruit in the center of the package ripens and decays early in the storage season. These are some of the

fundamental principles that govern the successful cold storage of fruit. They apply with equal force to the transportation of most fruits in cold temperatures. The successful transportation of perishable fruits in refrigeration depends primarily on the sound condition of the fruit; on cooling it soon after it is picked; on shipping it in packages which cool quickly throughout; on a dry, pure, cold air uniformly distributed in the car or compartment, and on a free circulation of air throughout the packages.

Conditions in a Refrigerator Car

The principal difference between a cold-storage warehouse and a refrigerator car lies in the poorer control of the conditions in the latter. The temperature is higher, the moisture greater, the distribution of cold air less uniform, and the refrigerating power less efficient.

Perishable fruit is usually loaded for shipment soon after it is packed, the temperature of the fruit approximating the temperature of the atmosphere. In the South and in the western semiarid parts of the country it is sometimes loaded at a temperature of 95° F. In the refrigerator cars in common use the temperature may drop to 40° or 50° F. after a few days in transit; but the top and center of the car are usually several degrees warmer than the bottom and the ends. A car of peaches packed in Georgia carriers, which allow a free circulation of air around the fruit, may cool gradually to 42° to 45° F. in three days in the bottom of the car if the fruit is at 85° F. when loaded. At the same time the fruit in the top of the car may be 10 degrees warmer. A car of peaches in which the fruit is wrapped and packed in 20-pound boxes which are piled closely together may take twice as long to cool down on account of the insulating effect of the paper and the poorer circulation of air between the boxes. The temperature in a refrigerator car continues to fall uniformly. It seldom rises in transit if the icing is well done.

In the first few hours or days of the journey, while the fruit in a refrigerator car is warm and moist, the rots and [fol. 60] the ripening processes develop rapidly, and they continue unchecked longest in the warmer air in the top and center of the car.

The Need of Improvement in Transportation Facilities

The foregoing remarks are made to bring out the need of further improvement, not only in the preparation of fruit for shipment, but in the conditions in transit as well. There has been a gradual improvement in the methods of refrigeration in transit from the pony refrigerators in use forty years ago, from the cooling by vertical cylinders in each corner of the car, and from cooling with V-shaped ice boxes suspended from the roof of the car. The refrigerator car of the present time is generally a well-built, thoroughly insulated structure capable of maintaining a uniform degree of cold under ordinary icing, after the fruit is cooled. Except in extreme cold weather, the temperature in a well-built car may not fluctuate 2 degrees in ten days. The most important improvement needed is a practical method of reducing the temperature of the fruit quickly in hot weather to prevent further ripening and the development of the rots during the early part of the trip. This improvement might be made by increasing the refrigerating power and by equalizing the distribution of cold dry air in the car. Or it could be accomplished by cooling the fruit before loading and maintaining refrigeration in transit only, as in the present methods of meat shipment. The discussion following will be confined largely to the preparation of the fruit for shipment rather than to the technical side of refrigerator-car improvement.

Methods of Reducing the Temperature of Fruit for Shipment

The fruit grower or handler can improve the carrying quality by delivering the fruit to the car or steamer in a cool condition. There is often a difference of 20 to 40 degrees Fahrenheit between the temperature of the air during the night and the day, especially on the Pacific slope. The cool night air ought to be utilized to the fullest extent in cooling the fruit. Peaches that are picked at midday or in the afternoon, then packed at once and delivered to the car, may be at least 20 degrees warmer than fruit picked early in the morning. If picked in the afternoon they should be delivered to the car the morning following, after standing in open packages exposed to the cool night air. A gain of

15 to 20 degrees in cooling before the fruit is loaded is a practical help to the carrying quality of the fruit. After the fruit is in the car, the temperature can be reduced more rapidly and to a lower degree by using a mixture of salt and ice instead of the large cakes of ice that are now in common use. Meat is refrigerated before shipment and is carried at a temperature ranging from 34 to 40 degrees in transit by the addition to the broken ice of about 8 to 10 per cent of salt.

[fol. 61] Cooling in Cold-Storage Houses.

A cold-storage house is the most efficient place to cool down fruit before shipping. The first shipments under these conditions known to the writer were made by Mr. Parker Earle in Illinois as early as 1872. Mr. Earle was a pioneer, in both the fruit and the refrigerator-car industries. On account of the serious losses in shipping strawberries in the early types of refrigerator cars, which held but 1½ tons of ice, he constructed several storage houses cooled with ice, in which the berries were cooled to about 50° F. before shipment. Before this time it had not been possible to ship strawberries to distant markets in sound condition, but fruit cooled in this way arrived at destination firm and sound. A little later Mr. Earle, with Mr. F. A. Thomas, developed a refrigerator car holding 5 instead of 1½ tons of ice. These cars carried the fruit so much better than the earlier cars that cooling in houses before the fruit was shipped was not extended at that time. In recent years this phase of the fruit-shipping business has received more attention on account of the more exacting conditions in the fruit trade as a whole.

Eastern-grown pears for export are refrigerated in cold-storage warehouses alongside the railroad before shipping. The pears are generally cooled after packing, as cold fruit condenses the moisture of the air and becomes wet if packed in a warm room. Sometimes the fruit is refrigerated in open-headed barrels or in picking boxes, and is afterwards packed in a cool room. Peaches that ordinarily develop considerable decay in the top tiers of packages have been shipped by the United States Department of Agriculture after cooling to about 40° F., and have reached distant markets in prime condition. In one shipment of 8,000 packages

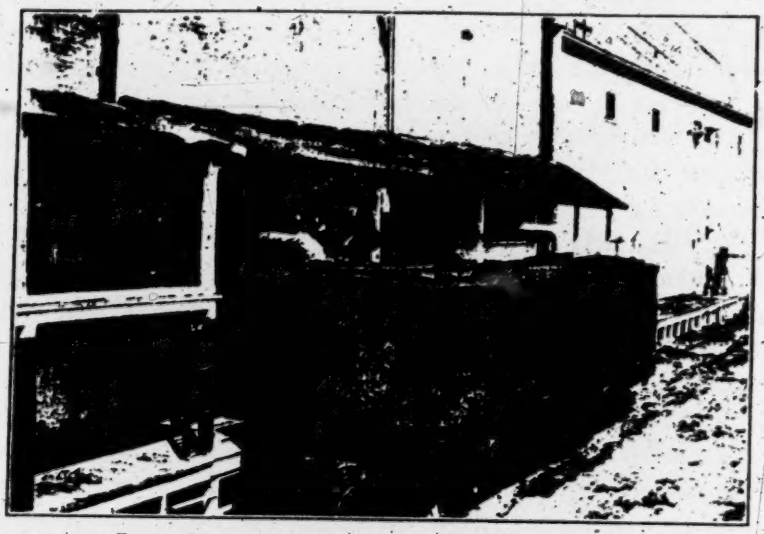


FIG. 1.—COOLING ORANGES IN CAR, LOS ANGELES, CAL., 1905.

FIG. 2.—COOLING BANANAS IN CARS, SPRINGFIELD, MO., 1905.

less than 1 per cent of soft and decayed fruit developed in the two upper tiers, while 5 to 30 per cent developed in cars cooled in the ordinary way.

At Coachella, in the semidesert Imperial Valley of California, a cold-storage plant has been erected for the manufacture of ice and for the cooling of cantaloupes before shipment. It was operated during the latter part of the season of 1905. The melons are frequently above 100° F. when picked, and when they are shipped without previous cooling are likely to arrive at destination in an overripe condition. The temperature is reduced to about 40° F. by placing the packed crates in a cold room, after which the melons are promptly loaded in an iced car, the fruit being protected against exposure to the warm air during the loading.

Cold-storage plants of this kind might be erected by the side of railroad tracks by large fruit growers or shippers, by associations of growers or shippers, or, in some instances, by refrigerator-car lines or by railroad companies and handled as a part of the refrigeration service.

(Here follows page 62)

[fol. 63] Cooling in Cars from a Cold-Storage Plant

Cold air is sometimes forced through the fruit after it is loaded in the car, in order to cool it quickly. This method was used by the Los Angeles Ice and Cold Storage Company, Los Angeles, Cal., in cooling oranges for the shipping experiments of the United States Department of Agriculture in 1905. (See Pl. XXXVII, fig. 1.) Cold air was blown through a large insulated tube leading from a bunker room in the storage plant to the ice trap in one end of the car. From a trap at the opposite end of the car another tube led back to the warehouse. The cold air was blown into the car at a temperature of 32° F., and after passing through the car was drawn back by an exhaust fan to the warehouse, where the moisture and gases from the fruit were frozen on the refrigerator pipes. The direction of the air current through the car could be changed. Although a powerful air current was used, it required from thirty to fifty hours to cool the fruit in the center of the packages to 40° F.

A large cold-storage plant has been erected recently at Springfield, Mo., by the St. Louis and San Francisco Railroad Company to cool bananas in cars in transit. The plant consists of four tracks inside of a shed, with light insulation, each track holding 10 cars. Large air ducts are carried along the top of this shed, and by means of canvas tubes the cool air is carried into a car at one end and taken out at the other after passing through the fruit, on the principle mentioned in the preceding paragraph. This same plant may be used in the winter to raise the temperature of the fruit when desired. Attempts have also been made to cool a car loaded with fruit by running it into a cold-storage room or shed. The first attempt of this kind known to the writer was made in Kansas City, Mo., several years ago, but the result was not satisfactory, as the refrigerating capacity of the machinery in use was insufficient. A car in the Springfield, Mo., plant, with the cold-air pipes attached, is shown in Plate XXXVII, figure 2.

Cooling in Cars with a Fan

Several devices are in experimental use for rapidly blowing the air from the melting ice in the car bunkers through the fruit. In one method a fan run by a small motor blows the air over the ice in one end of the car. It passes through the fruit and is drawn out of the other end of the car by an exhaust fan. It is then carried back to the end from which it started in a pipe surrounded by water from the melting ice. The same air is used over and over again. No fresh air is admitted to the car. Provision is made for reversing the direction of the air current. Sometimes the ice is crushed and salt added to produce a lower temperature.

[fol. 64] Many experimental attempts have been made to apply chemical refrigeration to cars in transit by installing a refrigerating machine in a car in the train and by pumping the refrigerating medium through pipes in the cars. None of these devices, however, is in practical use at the present time.

Time Required for Cooling Fruit

It takes a long time to cool a carload of fruit throughly. The temperature of the fruit, the temperature of the surrounding air, the rapidity of circulation of the air around

the packages, and the character of the packages and their contents are important factors in the rapidity of cooling. The air around the fruit may be cooled quickly, but the package and its contents give up their heat slowly. Under the most favorable conditions in a cold-storage warehouse the fruit in the center of a tight barrel of Bartlett pears stored in a constant temperature of 32° F. may not cool to that temperature within four to seven days if the fruit is about 80° F. when picked, while similar fruit in a 20-pound box or in a slat bushel crate may reach 32° F. in from twelve to twenty-four hours.

A fruit wrapper retards the cooling. There may be a difference of 10 degrees in temperature at the end of one day between a 40-pound box of unwrapped fruit and a 40-pound box of wrapped fruit. The fruit wrapper, however, protects the fruit against bruising to such an extent that its usefulness for this purpose outweighs the disadvantage of slower cooling.

Other Advantages of Cooling Fruit for Shipment

The air in a car of fruit that is cooled before shipment is comparatively dry and pure throughout the trip, in contrast with the moist, impure air in the car under ordinary icing. The quality of the fruit is therefore preserved to a greater extent when it is precooled. It is a common impression that a cold temperature injures the quality of fruit. This is not necessarily the case. The flavor of fruit from cold temperatures is not always good, but the impaired quality is generally caused by the absorption of impure odors while the fruit is warm. The air in a closed car under ordinary icing is charged with the gases given off by the hot fruit, but when it is cooled before shipment both respiration and transpiration are retarded and the air of the car is comparatively dry and pure.

Another advantage of precooling is that the shipper can allow the fruit to develop a high color and a fine flavor on the tree. Under the present method of handling, quick-ripening fruits like the peach and the plum that are shipped long distances have to be picked when partly developed in [fol. 65] order to protect them against the ripening that occurs in transit. The quality of the fruit is not developed, and it arrives in market with an insipid flavor, giving a

region in which this practice is followed a reputaton for fruit of poor quality.

Cooling before shipment is likely to be followed by unsatisfactory results in fruits that decay in transit from molds, unless the grower and the packer improve the methods of handling. These diseases are directly connected with the rough handling of the fruit. Many of the susceptible oranges, for example, develop rot in transit, while others that were cooled quickly begin to decay as soon as the fruit is removed from the car to a warmer air. If the shipper depends merely on colder temperatures in transit to overcome the effects of bad handling, the rots, instead of developing during the trip, are transferred to the market. Under these conditions the fruit trade becomes suspicious of all fruits shipped under refrigeration and the industry as a whole is injured.

Conclusion

The successful transportation of perishable fruit is a complex problem. It depends on the conditions under which the fruit is grown, the care in handling it, the conditions in transit, and the relation of these factors to the ripening of the fruit and to the development of decay. The losses in transit are the result of conditions the responsibility for which may be shared by the grower, the shipper, and the transportation company. A large proportion of the losses from decay is the inevitable result of handling a highly perishable type of product. Many of the losses are primarily orchard and packing-house troubles, which can be overcome by improving the methods of orchard culture and of handling the fruit. A well-grown, perfect fruit is a fundamental requirement in successful transportation. Every fruit that is bruised does not necessarily decay in transit, but if a mold spore comes in contact with an abrasion in the skin, decay is the inevitable result if there are moisture and heat enough to start it into growth. The rots develop rapidly in transit when the temperature is not low enough to check their growth. Most of the decays develop during the first few days of the trip, while the car is warm and moist. They might be reduced to a minimum if the fruit could be cooled more promptly after it is picked, either before or after loading in the car.

The losses from overripeness are equally complex. The fruit ripens rapidly as soon as it is picked and the ripening needs to be checked quickly at this time by a cold temperature. The grower may hasten the ripening by delivering the fruit to the car in a warm condition and by delaying the shipment after the fruit is picked. Once in the car the fruit continues to ripen until it is thoroughly refrigerated throughout. The losses of this nature are not wholly due to [fol. 66] the grower, the handler, or the transportation company, but may be due to causes for which each shares the responsibility.

The American fruit industry now requires better handling and better transportation facilities than in the early stages of its development. As the industry increases and the distribution of the products is extended, more careful treatment in the orchards and packing houses and an improvement in transportation service will be required if it is to be permanently successful. There has been great improvement along these lines, and unless the fruit industry and transportation facilities are exceptions to the general progress that is being made in all industries in America, the improvement in every particular should be greater in the years to come than in any period in the past.

[fol. 67] PLAINTIFFS' EXHIBIT No. 7

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The Influence of Packing Methods on the Carrying Qualities of Citrus Fruits

By Lloyd S. Tenny (Assistant Pomologist)

MR. PRESIDENT, LADIES AND GENTLEMEN: The agricultural interests of the world have made immense progress in re-

cent years, especially true is this in this country. In a single generation there have been developed our modern system of State Experimental Stations and the National Department of Agriculture. It was only recently that the primary object of these institutions and frequently the only real one, was the studying of plant diseases. This in turn gradually led into the work of plant breeding in all its phases, the securing of varieties resistant to certain diseases, those especially adapted to one soil or one climatic condition, and thus the work has broadened, not only along this line but along every line, until now we find the Department of Agriculture and many of the State stations under- [fol. 68] taking a careful scientific research along a multitude of lines connected with the farming interests. No phase of the subject is considered too small or too unimportant to be left out.

One of the subjects into which this study has led us at the Department of Agriculture is the transportation side of fruit handling. The wonderful extension of our railroads and the great headway that has been made in the methods of transporting perishable produce, has made it possible for every section of the country to produce those fruits and vegetables best suited to its soil and other conditions. And so the vineyards and orchards of California, the gardens of Texas, and the semi-tropic fruits and vegetables of Florida have come to be well known things over the country. But the one thing which has made all this practicable and has enabled the man of New York or Denver to have Florida fruits upon his table is the development of the transportation side of agriculture. The study of these transportation subjects and the methods of harvesting and packing fruits intended for distant markets is a study worthy of real investigation. What commercial advantage would it be to Florida to produce a delicious orange if you growers and shippers were unable to put this on the market at a profit.

Uniformly almost during recent years has good fruit demanded excellent prices. Methods of orchard management have been improved, so that the yield is nearly certain and the quality of the fruit high, the various fungous and insect diseases are watched and methods of preventing

their spread sought, and so along every line we find the conditions such as to justify us in expecting an industry at a very high point of development and such do we find to a great measure. The fact remains, nevertheless, that while we are producing something like a 4,000,000 box crop in this State, worth some ten millions of dollars, that the profits to the ordinary shipper are comparatively small. I realize at the same time that doubtless most of the orange [fol. 69] men here today are conducting their business on a liberal margin of profit; at the same time you will admit that there are those in your immediate neighborhood who are not so fortunate. These conditions exist in a measure at least from the great losses there are in transit from decayed or wasty fruit.

The Extent of the Loss from Decay

It is difficult to estimate the extent of this loss, since no accurate and detailed inspection reports are made, but not one of you will deny that there are heavy losses. As we have come into closer touch with the shippers throughout the State, we continue to get more of the inside information regarding this sort of loss. It is not uncommon to hear of cars arriving at destination with 20 or more per cent. decay; even in some exceptionally bad cases it runs as high as 50 per cent. From personal conversation with many of the large Florida commission men in New York City, a 15 per cent. loss seems a conservative estimate. One of the very large houses and one that favors Florida fruits, expresses their opinion as follows:

"The past season has been an exceptionally good one, and 10 per cent. would cover the losses in most of the cars, but in former years a 20 per cent. or 25 per cent. decay was not uncommon. We should think that a 15 per cent. waste would be a fair average for several years."

But for our purpose let us be even more conservative in our estimate of the loss from decay in transit and place it at 10 per cent., which means but 7 or 8 rotten oranges in each half box of 150s. With this moderate loss, it means on a crop of three million and a half boxes, the loss of three

hundred and fifty thousand boxes, or over one thousand cars of fruit. If the cost of picking, packing and shipping amounts to one dollar and a quarter a box, then you are paying out over $400,000 to harvest rotten oranges. If you are a shipper and buy your fruit at a dollar a box, that [fol. 70] means another loss of over $300,000, or to put the figures into one sum, you orange men of Florida are losing each year close to one million dollars from this one cause alone. The purpose of the Department of Agriculture in opening this line of experimental work is to determine whether this loss is a necessary one, and, if not, what are the causes and how far are the present packing methods to blame for the present condition of affairs. The subject is one that cannot be covered in an investigation extending over one season alone, nor over two, but it is one that must be followed for a series of years, or long enough to determine experimentally the effects of different methods of picking, hauling, packing and shipping, season after season. So let me say now that any statements made today or any results given, are only preliminary and subject to change as the work develops. The work was begun this past season, and, at the best, only a preliminary survey could be made the first year. Had it not been that the results obtained so far were so uniform and so suggestive, we would not feel justified in bringing before you even this preliminary report. I should like to say further that we are beginning this work with no set idea as to the influence of the packing methods on this subject, and so have no pet theory to advance. The work will be wholly experimental in nature, and our aim will be to devise methods of handling the citrus crop with the least amount of loss in transit.

The Cause of Decay

The decay which causes practically all the wasty arrivals is produced by the growth of a common blue mold fungus, a low form of plant life. The spores which form the blue covering on the surface of a rotten orange act as the seed for the reproduction of this plant. These are ever present, the dust of the air is laden with them, and each orange doubtless has many of them on its surface. Before decay takes place, three things seem to be necessary, as they are

necessary for the growth of any plant, a soil in which to grow, heat and moisture.

[fol. 71] One of the characteristics of the blue mold fungus is that it seldom if ever lives on living tissue. A perfectly healthy uninjured orange on the tree is seldom seen decaying. When the fruit is picked the life of the orange does not stop immediately, the cells continue active for some time after. It should, therefore, be impossible for the fruit to decay soon after harvesting, and from experiments we see that a perfectly sound orange may be covered with these spores and held in a warm, moist room and yet no decay takes place. But once bruise the fruit or injure its skin, thus killing some of the cells, and one of the conditions for the growth of this decay fungus has been supplied; it has proper soil conditions. If you place this injured orange on your desk in a very dry place, or put in a very cold room, it probably will not rot, but pack it in a box, wrapped in paper, so that any moisture there may be retained, and then place the box in a warm, moist spot and the decay will be very rapid.

With this understanding of the nature and cause of the common decay, it becomes easier to see how the harvesting methods might have an important bearing on the keeping quality of the fruit. If the methods are such as to injure it by bruising or cutting the skin, then we would look for decay, and in turn careful methods should give sound fruit.

Thorn Puncturing

Starting our investigations with the fruit as it hangs upon the tree, some injury has been done already by thorn puncturing and branch injury. In seedling orchards this damage at times may run quite high, and after a period of warm, moist weather, decaying fruit may be found on the tree. Close inspection of some of these in the early stage of the rot will generally show that the decay is beginning around some sort of a mechanical injury, although it may be so small that it is scarcely seen without the aid of a hand lens. This class of injury is increased by the method of picking, namely in the setting the ladder, by the picker pulling the [fol. 72] branches about, and by his hitting the fruit

against the thorns. In examining fruit from the same tree, picked by different men, it is common to find in one box five or six fresh thorn bruises, while in another not one is seen. A small number of counts made so far indicate that about 6.6 per cent. were thorn or tree injured. This varies from one to 22 per cent. Lots with 5 per cent., 3.9 per cent., 6.6 per cent. and 6.8 per cent. were found.

Clipper Cutting

Enormous damage may be done by puncturing the fruit with the clippers in the act of picking. On the other hand, it is not necessary to do any damage. Three years ago when Mr. G. Harold Powell, of the Department of Agriculture, began his work with the California citrus fruits, he found as high as 15 or 20 per cent. of the crop made subject to decay from this thing alone. He and his associates made records on hundreds of boxes, with the result that at that time a 5 per cent. injury was as low as could often be found; frequently the per cent. ran to 25, not infrequently to 40 or even 50, and with some individual pickers even to a higher amount. The shape of the Navel orange as grown in California, with a sunken area around the stem, favors this injury with the clipper. In attempting to cut the stem as close as possible, the shears punctured the skin. To a much less extent, this damage is found in Florida. The round orange is more easily clipped with a short stem, and there is much less danger of its being cut. A count of a considerable number of boxes show 5.9 per cent. clipper cut. In many cases no injury was done at all, and in a few the percentage ran high.

Mr. Powell has demonstrated by many shipping tests, and it is accepted as a fact among California shippers, that an orange with a broken skin is liable to decay in transit. Boxes of that class of fruit have reached New York City this past season with as many as 105 rotten oranges in a box of 126s. When injured fruit is shipped under ice or during cold weather, the decay upon arrival is often small. This [fol. 73] same fruit shows a rapid breaking down, however, when it is held a few days upon the market.

The following chart will indicate the amount of decay in injured fruit as compared with sound lots:

Chart I

Apparently free from mechanical injury 2 per cent. decay.
Mechanically injured ..... 48 per cent. decay.

The average for the sound fruit is 2.9 per cent. decay, while the injured fruit ran as high as 48.7 per cent. rotten. These figures are the results of the work done in Florida, and while the tests have been few in number, yet they only confirm the results obtained in California with series extending over a long period of time.

Long Stem Punctures

Another type of injury is the puncturing done by long stems. Some pickers leave a considerable number of stems sufficiently long to puncture other fruit. This damage may be done as the fruit is dropped into the picking bag, from the movement of the oranges in the bag, in the hauling, or somewhere in the packing house.

Injury From Dropping

It was a question, however, whether all the decay which develops in a car of oranges in transit from Florida could be attributed to the above causes. With 3 or 4 per cent. thorn punctured fruit, 8 or 10 per cent. clipper cuts, and some additional stem punctured oranges, it is difficult to explain a 40 or 50 per cent. decay. These high percentages seem to indicate that at times at least nearly or all of the fruit was made susceptible to decay. To a fruit man unaccumstomed to your methods of harvesting and packing, the most probable explanation of this condition would be in the amount of rough handling and dropping to which the fruit is subjected. The picker in his hurry lets the fruit fall into his basket or bag and generally takes pains to give each orange an extra shove with his shears as he aims the [fol. 74] fruit toward the basket. He often holds the branch with one hand and allows the oranges to drop the 18 inches or 2 feet into the basket. In an ordinary gang, a drop of 12 inches seems about the minimum which any

orange receives in the picking; two feet is not uncommon. In pouring into the field crate, which is 13 inches high itself, the mouth of the bag is held 6 inches above the box, and here is another drop of 18 inches onto the bottom. Not counting the rough handling in loading and in hauling, sometimes over very rough roads, there is another very dangerous drop into the hopper. This is often large and the fruit rolls down a steep gravity run and hits again. With another tumble into the bins the oranges are ready to pack. The question then is, does dropping make the oranges susceptible to decay? The only way to settle such a question is by experimenting. Pick carefully some boxes of oranges, pack half the lot as they are, drop the other half a certain known distance—we selected 18 inches—then pack them and hold along with the first lot for 10 days or two weeks. Do this, not once, nor twice, but a hundred times, and you will begin to know whether an 18 inch drop will cause any decay. Here are some of the results of our first year's work.

These experiments were done in your own packing houses, through the courtesy and excellent co-operation of the owners and foremen. At the same time that the experimental lots were packed, several boxes from the regular house pack of the same fruit were set aside. These were picked, hauled and packed in the usual manner and by the regular workmen. In preparing the series of dropped fruit, unusual care was taken to have the oranges picked carefully and not dropped into the bag and box. All mechanically injured fruit was removed and there were no long stems. Just before packing each orange was held 18 inches above the floor or bottom of the box and dropped separately this distance.

[fol. 75

Chart II

Carefully handled	1.9 per cent. decay.
Dropped 18 inches	32.0 per cent. decay.
Regular house pack	42.0 per cent. decay.

Chart III

Carefully handled	2.8 per cent. decay.
Dropped 18 inches	13.0 per cent. decay.
Regular house pack	21.5 per cent. decay.

Chart IV

Carefully handled	0.0 per cent. decay.
Dropped 18 inches	21.8 per cent. decay.
Regular house pack	18.7 per cent. decay.

Chart V

Carefully handled	10.0 per cent. decay.
Dropped 18 inches	77.0 per cent. decay.
Regular house pack	61.0 per cent. decay.
Mechanically injured	98.0 per cent. decay.

Chart VI Summary

Carefully handled	2.9 per cent. decay.
Dropped 18 inches	20.1 per cent. decay.
Regular house pack	22.9 per cent. decay.

Charts II to V give the results of some of the individual experiments. Many more were made and chart VI summarizes the results of them all. The only difference between the fruit which showed 2.9 per cent. decay and that which contained 20.1 per cent. was in the drop of 18 inches. How much of the 22.9 per cent. waste in the house pack may be attributed to a similar cause, we will leave to you to judge, who know something about the amount of rough handling a box of fruit ordinarily receives.

Summary.

It does not seem best at the present time to make any very definite recommendations. I should like to present, however, the following questions for your consideration. [fol. 76] Is there not an immense amount of rough handling in your orange groves and packing houses?

Is it not reasonable to expect, and do the experiments not indicate, that the injured and dropped fruit has been made susceptible to decay?

Other conditions, such as the amount of moisture and heat at the time of packing, the length of delay in shipping, the time in transit and the character of the weather encountered, all have their bearing. But as a preliminary

consideration, is it not more than probable that the packing methods have much to do with the keeping quality of citrus fruits?

Discussion

Member: What is the character of the land? High pine land fruit?

Mr. Tenny: All kinds. This is one of the things of which more definite notice will be taken another year. We did not find a great deal of difference in the results where the experiments were made with high pine land or hammock land fruit. There were, however, striking differences in individual lots of fruit.

Mr. Hart: A question I have in mind is whether, if that fruit was kept a little while and cured and softened up, it would not have gone through with less percentage of rot. When an orange is just off the tree and rigid, the drop would injure it considerably more than after it had been off the tree for 24 or 36 hours, and that brings up the matter of whether curing is desirable or not before shipping.

Mr. Tenny: Oranges that have been picked some time will probably not be injured as much by dropping as those that are freshly picked. The difficulty, however, lies in the fact that a large proportion of the damage is done in the picking, hence curing some time after picking will not remedy the trouble. Under your present harvesting system, the trouble is in getting your fruit into the packing house. There is little doubt that an orange that is cured will stand a drop better than one that is just picked and consequently hard.

[fol. 77] Mr. Hart: Then another important point is that where fruit is shipped in small quantities, it is loaded largely by the freight handlers, and it is not unusual for them to shoulder the box and give it a shove and let it go. Now, if we had cured the fruit, I think it would have been injured less than when packed immediately from the tree and crowded into boxes.

Mr. Tenny: The matter of delaying the shipment will be taken up before our work is finished. I could give you some of the results from the California end, but do not feel justified in doing that, because the same conditions might not hold good here in Florida.

Mr. Hart: In putting on the covers of the boxes considerable injury might be done, while, if partly cured, it might get into market in better shape.

Dr. Richardson: There has lately come into use a different kind of pack. We used to put the oranges in and press the top down and nail it. Now, the market seems to like a loose pack. The ends of the top are nailed down and the center at the partition, is not nailed down, and it bellies out. Was the pack you used the loose or the firm pack? I think the loose pack permits the fruit to be bruised.

Mr. Tenny: We use the firm pack. In any case, there was no damage in our experimental lots after the fruit was packed. Any injury that appeared on this fruit was made before the box was nailed up. The boxes were set in the packing houses very carefully and no injury was done by the dropping or the rough handling of the boxes.

Mr. Skinner: In my opinion, this is one of the most important sessions. Now, about the picking of the fruit; at the start I want to say that I don't see what we are going to do. I had one man six feet and over picking for me, and found him with his arms extended full length and dropping them down to the basket. I don't know how in the world we are going to get rid of the trouble. Last year, I provided my men with a bag to tie around them that had a kind [fol. 78] of a proboscis. I also agree that there is a great deal of trouble in the packing, but how to overcome it is a question. Naturally, this brings up the labor question. I shipped this past season about 60,000 boxes, and every time I saw a fellow dropping an orange, it touched me right on a tender nerve. You can imagine that by the end of the season I was a nervous wreck. There seems to be seasons when everything carries well, and then another season when everything rots. Mr. Sampson shipped a carload of oranges to Augusta, Ga., and they were not over three or four days in transit, but when they arrived there, they were entirely worthless. I do not know how to meet these conditions. I expect to try a blower to see if I cannot dry my fruit. The atmosphere in this country is saturated to the full point with moisture, and sometimes the oranges are dripping wet with moisture from the atmosphere. I would like to know your opinion as to whether it would be practicable to use a blast of that kind to keep the fruit dry.

Mr. Tenny: This is a question considerably discussed in California. I am not willing to venture an opinion on it. The point in question is this: If the climatic conditions are such so that the atmosphere contains 90 per cent, or so of moisture, and this moist air is blown over the fruit, it may apparently dry them off, but in reality the air which is around the fruit after it is packed is still very moist. As the oranges continue to give off moisture after being packed, it seems probable that if the weather is moist, there would still be sufficient moisture to allow decay to take place. Regarding the question as to why one lot of fruit will decay while another packed apparently under similar conditions arrives in a sound condition, is possibly because the atmospheric conditions at the time of the two shipments were entirely different. One shipment may have been injured by the pickers, and at the time of packing the weather was dry, while in a short time the conditions may be entirely different, and a lot of fruit injured in a similar manner to the first lot may show a heavy decay. The relation [fol. 79] between the climatic conditions here at the time of harvesting and the decay conditions upon arrival on the market is something we want to investigate further. How much good may be accomplished by blowing air over the fruit, I do not know.

Dr. Phillips: I would like to ask what the gentleman thinks about using the brush.

Mr. Tenny: If your fruit is not dirty, do not brush it. Do not handle your oranges any more than is absolutely necessary. If they do not need washing or brushing, don't do it. They may be washed or brushed probably without serious damage, but make a practice of handling your fruit just as little as is possible. I know of no wash yet discovered that will kill the spores of the decay fungus and at the same time not injure the fruit. This fungus is the same that causes the blue mold on bread and other things, so the spores are ever present. It is not a parasite, it is a saprophyte; that is, it lives on dead tissues. It will not live on a live, healthy orange.

Mr. Gibbs: What class of labor do you depend on in California for picking oranges?

Mr. Tenny: They have the Japanese, Chinese, Mexican and hoboes. I realize that you have hard labor conditions here in Florida, but we had this same thing to meet in Cali-

fornia. But let me ask you this. If all your orange trees were transformed in a night to peach trees, wouldn't you gather the entire peach crop without punching them or dropping them? Wouldn't you?

Mr. Hart: This seems to be an experience meeting. Mr. Skinner was speaking about the question whether we could overcome the careless picking or not, and I would offer one suggestion which I got from Mr. Stevens in regard to that matter that has been of great help to me. That is, to have all your field pickers have a piece of chalk and put their numbers on the boxes. When it comes into the packing house, if there is any injury to the fruit that has been picked, you can identify the picker who did that work; then, [fol. 80] of course, you can speak to your foreman and have him see that the trouble is corrected or the picker discharged. Where you have careless pickers (and they will get careless if not closely watched) they think that their fruit goes in with all the rest so you cannot identify it, and consequently they take little pains.

The next point is about the current of air in the packing house. I can take an orange and with my thumb nail cut through the cuticle clear around the orange and put it up on a beam and it will dry up and the wound will become air-tight. It can go into the market, if the conditions are fairly good, after it has left my packing house, in good shape. I believe a current of air is very important in a packing house, and if you can sweep a dry current of air through, it will heal those wounds.

Now, about the moisture in the atmosphere. If the fruit gets cold during the night, and the morning comes up bright and warm, the orange does not warm up as quickly, and the warm air deposits its moisture on the oranges and makes them wet. I have my packing house so built and arranged that I can close it up entirely. If the night has been cold and the days are warm I close it up early in the day and keep my oranges dry until packed. If I open a window or a door, even for a few minutes, the oranges are wet.

As to the picking boxes, to avoid too deep a drop, I would have my field boxes shallow. I would not have them as deep as some do. For the picking receptacle I would not use a bag. There may be less danger of injury from drop-

ping, but you can tell your men to put them into any receptacle without a drop. When they put them into a bag they are climbing over the tree. It is a thorny tree, and they cannot help but get the bag against the thorns and branches of the tree, or thumping it against the ladder. There is a gentleman here, I think, who invented a metal receptacle, so that you can stoop down and allow the oranges to slide through the lower end without any drop. I believe we can pick into these picking baskets safely. They are the best [fol. 81] of any kind that I have found, when of the correct shape. The baskets are made by the Wakefield Rattan Company in East Boston. I have paid all the way from $1.00 to $2.50 for them.

Member: What size of basket is most desirable?

Mr. Hart: I think those that hold out half a box, fairly deep, but not wide from the body outward. The outside should be higher than that next to the picker.

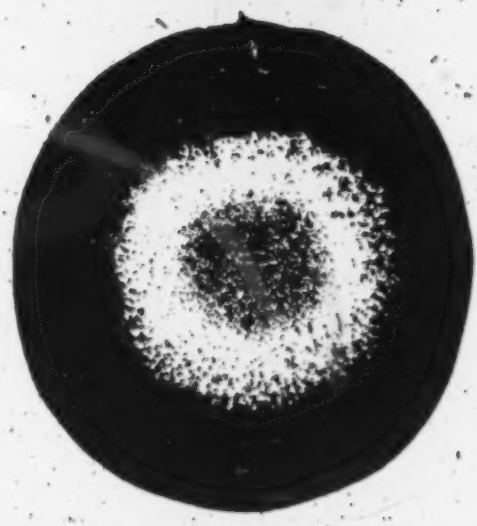
Now, about brushing and washing. I do not believe you can put your fruit in really first-class shape with a brush, unless you have water connected with it some way. I wash mine particularly on account of the fly-specked fungus which gives the fruit a little cloudiness. Fruit shipped without has not such a tempting appearance, but that which has been washed meets more the demands of the very best trade and looks like pure gold. If you run a brusher over a rotten orange, you are apt to inoculate every bristle. I do not think that you can get satisfactory results without using water. To put the fruit on the market in the best possible condition, I think it must be washed. I think more and more will come to that conclusion and adopt the washer, and there is at least one washer on the market that will do it in fine shape and without injury if properly handled.

Out of my grove this year we lost simply one box of oranges from the whole packing. The lot in which that was, was shipped under extremely severe conditions after it left my hands. This year I shipped until the middle of March. I speak of this to show you that washing does not injure the fruit; if anything, it is of benefit. I have taken fruit picked by the same man, put half of them through the washer and the other not, and stored them away in the packing house and left them there for six or eight weeks, and in each test the unwashed fruit gave away first,

PLAINTIFF'S EXHIBIT No. 8.

Bul. 183. Bureau of Plant Industry, U. S. Dept. of Agriculture. PLATE I

83-84



WASHINGTON NAVEL ORANGES SHOWING BLUE-MOLD DECAY.

(Specimens considerably reduced in size)

Mr. Tenny: I would like to ask Mr. Hart if his orange crop was a peach crop, if there would be any bruises on it when it was shipped.

[fol. 82] Mr. Hart: Not if I could help it; nor are there any on any oranges if I could help it. I am especially particular about that, and not only have my pickers to be careful, but when the fruit goes into the washer there is not an orange goes through, but that there has been a finger, thumb or eye on the calyx, and no long stem goes in. If there is a puncture in that fruit, that fruit is laid aside, every orange is examined again by the grader, and all found injured in any way are discarded.

Mr. Gibbs: Do you use any mechanical agency, such as potash?

Mr. Hart: Up to this year I used soap, but this year I have not used any at all and found the results equally as good. I prefer soft water, though I use some pump water. I prefer soft water, and think the oranges can be washed without soap successfully.

Mr. Julian: Could you put up five cars of fruit and do this?

Mr. Hart: Well, yes, sir; I would wash every orange. Of course, it is pretty nearly impossible for the very large shipper to give the careful handling to the fruit that a smaller shipper can, but I would do it just as nearly as I could, anyway, or sell off a part of the grove and get the same or a little better income by giving more care to the balance.

From the drying rack they go into the drying crates. These in my packing house, are made five by six feet and set on a bearing that allows of tipping to run the fruit to either end. The oranges are never two deep when curing. I do not intend to ship in less than forty-eight hours after my fruit is picked; a little longer is just as good. By that time injured fruit shows up and is culled out more easily and surely.

(Here follows Plaintiff's Exhibit 8, pages 83 & 84)

[fol. 85] U. S. Department of Agriculture, Bureau of Plant Industry

Bulletin No. 123

B. T. Galloway, Chief of Bureau

The Decay of Oranges While in Transit from California

By G. Harold Powell, Pomologist in Charge of Fruit Transportation and Storage Investigations, Assisted by A. V. Subenrauch, L. S. Tenny, H. J. Eustace, G. W. Hosford, and H. M. White, of Field Investigations in Pomology

Issued March 31, 1908

(Seal of United States Department of Agriculture)

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[fol. 87] Letter of Transmittal

United States Department of Agriculture, Bureau of Plant Industry, Office of the Chief, Washington, D. C.

November 22, 1907.

SIR: I have the honor to transmit herewith a manuscript entitled "The Decay of Oranges While in Transit from

California'' and to recommend that it be published as Bulletin No. 123 of the Bureau series. It has been prepared by Mr. G. Harold Powell, Pomologist in Charge of Fruit Transportation and Storage Investigations, assisted by Messrs. A. V. Stubenrauch, L. S. Tenny, H. J. Eustace, G. W. Hosford, and H. M. White, all of Field Investigations in Pomology, and has been submitted by Mr. William A. Taylor, Pomologist in Charge of Field Investigations, with a view to publication.

The investigations summarized in this manuscript are unique in that they have involved the actual handling and careful inspection of large quantities of oranges through all the various operations to which the fruit is subjected in its progress from the trees in California to the markets in eastern cities. This has included the actual custody of numerous carload lots of fruit while in transit under different methods of railroad transportation. The investigations, in general, have been conducted on a commercial scale and under commercial conditions, with a view to securing accurate data regarding the practical requirements and needs of different phases of the industry, but the laboratory method has been applied to the fullest extent practicable under the conditions existing in the field, the packing house, the storage warehouse, the railroad car, and the salesroom.

The perishable character of the product under investigation, taken in connection with the physiological and economic factors involved in its harvesting, transportation, and sale, has apparently been responsible for much of the misapprehension that has hitherto existed regarding the causes of decay of California oranges in commerce. A satisfactory determination of those conditions has required continuous observation of large numbers of representative lots of fruits simultaneously at distant points. No indi- [fol. 88] vidual producer or receiver has found it practicable to make such an investigation. In fact, it developed early in the investigation that the problems could be promptly and economically solved only through the development of an organized corps of scientific workers who could prosecute different phases of the work simultaneously in the producing sections, in transit, and in some representative eastern market, maintaining continuous communication by mail and telegraph, so that the conditions to which the various ship-

ments of fruit had been subjected could be thoroughly understood. Such a corps of workers has been gradually built up in this work, and the results set forth herein are believed to fully justify this feature of the Bureau organization.

The present paper is the first formal and comprehensive publication of the results of these investigations. It should be stated, however, that the various branches of the industry have been informed from time to time regarding the progress of the work. This has been accomplished through addresses delivered before meetings of growers and of various organizations of warehousemen, refrigerating engineers, and railroad men, as well as through the personal contact of a large number of packing-house foremen with the experimental work. Occasional circular letters summarizing the conclusions reached have been sent to the individuals and associations interested.

Largely as a result of the thorough organization of the industry and the active cooperative spirit shown by the leading men in it, a prompt and general modification of methods has resulted and is still in progress. While the work is not yet complete, it is believed that the phases reported upon should be given wider publicity in all our orange-producing districts because of the bearing they are likely to have upon the handling of this and other fruits in commerce.

The accompanying illustrations are necessary to a full understanding of the text.

Respectfully, B. T. Galloway, Chief of Bureau.

Hon. James Wilson, Secretary of Agriculture.

[fol. 89] Contents

	Page
Introduction	93
General description of the California citrus-fruit industry	93
The extent of the citrus-fruit industry	94
The location of the citrus-fruit industry	95
Cultural conditions in the citrus-fruit belt	95
Methods of handling and marketing the citrus-fruit crop	96
Picking citrus-fruits	99

Page

Packing citrus fruits 100
Shipping citrus fruits' .....
The investigation of the causes of decay 104
The blue mold of citrus fruits 105
Mechanical injuries related to the handling of oranges 107
The extent of the mechanical injury of the orange 108
Growers and packers not aware of the extent of mechanical injury 109
The injury of the fruit an economic problem 111
A reduction in the cost of handling a perishable product not always justifiable 112
A weak point in the present method of handling the orange 113
Methods of insuring a uniform condition of the fruit 113
Experiments with different methods of handling oranges 114
The experiments with oranges stored in packing houses 114
The decay in oranges in different sections 116
The decay in oranges in different periods of the season 118
The curing of oranges before packing 120
The brushing of California oranges 121
The washing of California oranges 122
The necessity for washing the fruit should be avoided 123
Packing-house equipment and conditions .. 124
Features to be avoided in a packing house 124
The decay of oranges in transit 126
General description of the experiments 126
The shipments under ventilation 127
Methods used in preventing decay in oranges in a large commercial business 129
The shipments under ice 130
A practical illustration of careful handling methods 131
An illustration of better handling methods 132

Page

The shipments of precooled fruit 133
A comparison of the decay found in connection with the different methods of shipment 135
[fol. 90] The object of cooling fruit before shipment 136
The refrigeration of citrus fruits in transit 136
The cooling of oranges before transportation 137
Historical data on the precooling of oranges 139
The keeping quality of oranges after arrival in market 141
The investigation of the temperature of oranges while in transit 145
Temperature records in ventilated cars 146
Temperature records in iced cars 149
Temperature records of fruit cooled before loading and iced regularly in transit 150
Temperature records of fruit cooled before loading and iced in California only 151
Summary of precooling records 153
Summary 153
Description of plates 156
Index 165

[fol. 91] Illustrations

Plates

Plate I. Washington Navel oranges showing blue-mold decay ..... Frontspiece.
II. Washington Navel orange trees. Fig. 1.—A tree sent to California by the Department of Agriculture in 1873. Fig. 2.—A tree three years after planting 156
III. California orange groves and a packing house. Fig. 1.—A typical view of bearing orange groves. Fig. 2.—Interior view of an orange packing house with an overhead sizing machine 156
IV. Orange brushing machines. Fig. 1.—A common type of brushing machine, with a hopper. Fig. 2.—A belt-carrying device over a brushing machine 156

Page

V. Orange packing-house machinery. Fig. 1.—An automatic weighing machine. Fig. 2.—A type of sizing machine 156
VI. An interior view of a desirable type of orange packing-house 156
VII. The washing of citrus fruits. Fig. 1.—A lemon washing machine in operation. Fig. 2.—Washed oranges on drying racks 156
VIII. Valencia oranges. Lower specimen affected with sooty mold fungus 156
IX. The cooling of oranges in cars before shipment. Fig. 1.—The experimental plant used in 1905. Fig. 2.—The experimental plant used in 1907 156

Text Figures

Fig. 1. Types of shears or clippers used in picking citrus fruits. A, a sharp-pointed type; B, clippers with blunt points; C, sheath clippers 99
2. Grading belts used in assorting oranges 101
3. Boxes of oranges in a car, showing the standard method of loading 103
4. Diagram illustrating the average amount of mechanical injury in oranges in ten packing houses 108
5. Diagram illustrating the average amount of mechanical injury in oranges of ten growers who pooled their fruit 109
6. Diagram illustrating the average quantity of fruit cut by ten pickers in the same grove 110
7. Diagram illustrating the average quantity of injured oranges found in bins or packed boxes 111
8. Diagram illustrating the percentage of decay in oranges held in packing houses, 1907 116
9. Diagram illustrating the percentage of decay in oranges picked at different times during the harvesting season, 1906 119
[fol. 92] 10. Diagram illustrating the percentage of decay in oranges handled with average care, shipped under ventilation, February, 1907 128

Page

11. Diagram illustrating the percentage of decay in oranges handled rather roughly, shipped under ice, February to April, 1907 130
12. Diagram illustrating the percentage of decay in oranges cooled before shipping, March to May, 1907 134
13. Boxes of oranges packed in accordance with the method used in loading a car with 549 boxes 139
14. Diagram illustrating the percentage of decay upon arrival in market and for two weeks thereafter of precooled oranges handled carefully, 1907 140
15. Diagram illustrating the percentage of decay upon arrival in market and for three weeks thereafter of oranges handled roughly, shipped under ice, 1907 141
16. Diagram showing the temperature record of a carload of oranges shipped under regulated ventilation, April, 1906 142
17. Diagram showing the temperature record of a carload of oranges shipped under regulated ventilation, April, 1907 143
18. Diagram showing the temperature record of a carload of oranges shipped under regular icing, May, 1906 144
19. Diagram showing the average temperature record of two carloads of oranges shipped under regular icing, May, 1907 145
20. Diagram showing the temperature change of the oranges in the top and bottom tiers of boxes in a car shipped under regular icing 146
21. Diagram showing the temperature record of a standard carload of 384 boxes of oranges, precooled and shipped under regular icing, March and April, 1907 147
22. Diagram showing the temperature record of a carload consisting of 549 boxes of oranges, precooled and shipped under regular icing, April, 1907 148

Page

23. Diagram showing the temperature changes in the fruit in the bottom, middle, and top tiers in a carload of 549 boxes of oranges, precooled and shipped under initial icing only 149
24. Diagram showing the temperature record of a carload of oranges, precooled and shipped under initial icing only, May, 1906 150
25. Diagram showing the temperature record of a carload of oranges, precooled and shipped under initial icing only, May and June, 1907 151
26. Diagram showing the temperature record of a carload of oranges, precooled and shipped without icing under regulated ventilation, April, 1907 152

[fol. 93] The Decay of Oranges While in Transit from California

Introduction

Soon after the United States Department of Agriculture, through the Bureau of Plant Industry, began a study of the storage and transportation of fruit the orange growers of southern California requested that an investigation be made of the decay in citrus fruits while in transit to eastern markets. The losses from decay were estimated variously to be from $500,000 to $1,500,000 annually.

The financial importance of this large amount of decay to the orange grower and shipper, to the buyer, and to the orange-consuming public made an investigation of the possible causes desirable.

A general survey of the industry was made in 1904, and for six months in each year since, experimental investigations have been carried on in an extensive way in the groves, in the packing houses, in the cars in transit to the East, and in the markets.

As this investigation has been so closely related to all the operations of the California citrus-fruit business, a general account of the industry will be necessary for a proper

understanding of the discussion of the causes of decay in oranges during shipment.

General Description of the California Citrus-Fruit Industry

The introduction of the Washington Navel orange in 1870 from Bahia, Brazil, by the United States Department of Agriculture under the name of the "Bahia" orange and the sending of two trees propagated from those introduced from Brazil to Mrs. L. C. Tibbets, Riverside, Cal., in 1873, mark the most important epoch in the history of citrus-fruit culture in California. There were many types of oranges growing in southern California at that time, most of which were descended from trees planted in the gardens around the old missions by the Spanish fathers. None of these oranges equaled the new Navel orange. This orange [fol. 94] was a prolific bearer, the fruit of fine quality, the flesh meaty, juicy, and seedless, and the skin of a texture that insured good shipping quality, of a rich deep-orange color. The trees were of medium size, which made the groves more manageable than those of the tall-growing seedlings. This variety was named by the Californians the "Washington Navel," in honor of the city from which it was sent to them.[a] (Pl. I.)

The Washington Navel was widely planted in southern California, the State acquired a world-wide reputation for its citrus fruits, and a new era in orange culture in America began. In 1906-7 the Washington Navel crop in California reached a value of $12,500,000, with a gross value, including freight and icing charges, of $20,000,000.

The two trees sent to California by the Department of Agriculture are objects of historic interest in the city of Riverside at the present time. One of the trees was trans-

[a] The Washington Navel orange was first called "Bahia" by the late William Saunders, Horticulturist of the United States Department of Agriculture. This name has been adopted by the American Pomological Society and appears in its catalogue of fruits. The name "Washington Navel" is in almost universal use, however, and although of later origin than "Bahia" it will be used in this publication.

planted by the city from the Tibbets place in 1903 and stands in a thrifty condition at the head of Magnolia avenue. The other tree, shown in Plate II, figure 1, was transplanted in May, 1903, with the assistance of President Roosevelt, to the court of the Mission Inn.

The Extent of the Citrus-Fruit Industry

The citrus-fruit industry of California has grown up gradually. It began to assume commercial importance by 1880, and in 1886 amounted to a thousand carloads of 300 boxes each. Between 1890 and 1895 it had grown to from 4,000 to 7,000 carloads annually, and from 1900 to 1907 to between 25,000 and 32,000 carloads annually, i. e., from 6,000,000 to 11,000,000 boxes, having a gross value of about $1,000 a carload, or from $25,000,000 to $32,000,000.

The lemon comprises from 10 to 15 per cent of the citrus crop. There are a few pomelos (grape-fruit) grown. Three-fourths of the oranges are of the Washington Navel variety, the remainder comprising the Valencia as the most important variety, with fewer of the St. Michael, Mediterranean Sweet, Thompson, Ruby, Maltese Blood, Jaffa, seedlings, and tangerines. There are probably from 60,000 to 70,000 acres of citrus fruits in California, distributed among 5,000 to 6,000 growers. From 90 to 95 per cent of the citrus fruits are shipped to markets outside of California.

[fol. 95] Cultural Conditions in the Citrus Belt

The Location of the Citrus-Fruit Industry

The citrus-fruit industry has reached its greatest development in southern California, which is made up largely of the San Bernardino, San Gabriel, and San Fernando valleys. It has become most prominent in the foothill regions and lower lands extending down from the San Gabriel and San Bernardino mountains, which make up the Sierra Madre Range; in the Riverside district; at the base of the Temescal Range on the Corona bench, and in the Coast region in Orange and Los Angeles counties. There are smaller but not less favorable regions in Santa Barbara and Ventura counties, close to the mountains, and in San Diego County.

In recent years the industry has been developing north of the Tehachapi Range of the Sierra Madre Mountains,

especially in Tulare, Kern, Fresno, and Butte counties, though oranges are grown to a limited extent in other fruit-growing counties in the central and northern parts of the State as well. The greatest development has occurred in Tulare County, where the annual production is now about 2,000 cars of oranges, mostly of the Washington Navel variety. New plantings have been made which under favorable conditions may increase the annual production in that section to 10,000 cars in the next few years.

The orange crop of northern California matures from four to six weeks earlier than it does in the southern part of the State, notwithstanding that it is from 200 to 500 miles farther north. This unusual condition is due to the topography of the Pacific coast. The large inland valleys of northern and central California lie between two great mountain ranges extending north and south. The Coast Range Mountains shut off the modifying influences of the sea, causing relatively higher night temperatures during the summer months than prevail in the southern part of the State.

Cultural Conditions in the Citrus-Fruit Belt

Citrus fruits are grown in California on many types of soil under an intensive system of orchard management. Irrigation is necessary except from December to April, when the rainfall usually occurs. As in other horticultural industries there has not yet been developed a uniform system of management in respect to the handling of the soil, the use of water, the application of fertilizers, or in the handling of the trees. In a general way, it may be said that the tillage is frequent and thorough during the season from March to August or September; that cover crops, especially winter vetch, Canada peas, and burr clover, are coming into general use as a winter covering and as a means of improving the condition of the soil; that pruning, except with the lemon, is not systematically practiced; and that [fol. 96] commercial fertilizers of various kinds are probably used more extensively than in any other orchard industry in the country; except in citrus-fruit growing in Florida.

The groves are variable in size, the smaller ones containing from 5 to 10 acres, the latter being a common unit

of size. There are many of 15 to 20 acres or more, and the groves of some growers range from 100 to 200 or more acres. There are a few large companies and corporations engaged in the business, some of them having from 250 to 2,500 acres of citrus fruits.

A Washington Navel orange tree three years after planting is shown in Plate II, figure 2, and a typical view of orange groves in bearing is shown in Plate III, figure 1.

The harvesting of the Washington Navel crop begins in November in northern and central California, and extends to the middle of June or the first of July in southern California. The Valencia season opens the latter part of May and extends into the latter part of September or the first of October, the trees at that time bearing the crop to be harvested and the partly developed fruit for the crop of the following season. The other varieties of oranges are harvested from February to July. The lemon is picked from the same grove in practically every month of the year, although the largest part of the crop is harvested from November to May, a single tree generally containing fruit in all stages of development from the blossoms to the mature lemon.

Methods of Handling and Marketing the Citrus-Fruit Crop

The citrus-fruit growers of California are as a class men of high intelligence, and many of them are of large business experience and capacity. Cooperation in the handling of the citrus fruits is the corner stone on which many of the successful business practices rest. Among the various systems of marketing the fruit there have been developed some of the best examples of cooperative organization among fruit growers to be found in America.

These cooperative associations, organized primarily for the business of packing and distributing the fruit to market, handle from 70 to 75 per cent of the entire citrus-fruit crop.

There are also firms and individuals who pack, distribute, and sell fruit on commission for the growers. More or less of this fruit is sold f. o. b. cars in California, subject to inspection on arrival in market, or for cash f. o. b. cars in California, while some is consigned to distant merchants. There is also considerable buying of the fruit from the

growers either by the pound or in lump in the orchard taken as a whole. There are a few growers and fruit-growing corporations who pack and market their own fruit. About [fol. 97] 40 per cent of all citrus fruits shipped from California is sold at public auction in eastern markets.

Among the cooperative organizations, the California Fruit Growers' Exchange packs and sells through its own district agents in the markets somewhat more than 50 per cent of the entire citrus crop. This organization is formed to regulate the distribution of citrus fruits throughout the country and to give to its members the benefits that arise from its cooperative efforts of various kinds. This Exchange represents about 4,000 growers, who are organized into more than 80 local incorporated associations, the primary function of which is to prepare the fruit for market. The associations in the different producing regions combine into one or more local incorporated district exchanges or selling agencies, which sell the fruit through the district agents or at public auction and receive the money therefor through the medium of the California Fruit Growers' Exchange. There are 13 of these district exchanges. Each local district exchange selects a representative to act for it on the board of directors of the California Fruit Growers' Exchange, which is an incorporated body acting as an agency or clearing house for the district exchanges in the marketing of their fruit and which operates for the growers without profit to itself. It takes the fruit of the district exchanges after it is packed, and with their cooperation and advice places it in the different markets of the country, sells it, collects the proceeds, and turns them over to the district exchanges, which in turn pay the growers through the local associations. The California Fruit Growers' Exchange is the agency through which the grower is able to control the larger business problems and the general policy of the handling and marketing of the citrus-fruit crop.

An association, whether a part of the California Fruit Growers' Exchange or organized independently, is composed of a number of growers who are incorporated with a board of directors and officers for business management. The association usually owns its own packing house, where the fruit of the members is assembled and prepared for shipment, or the association may lease a packing house from a railroad. The fruit of an association is marketed in the

name of the association or of the district exchange of which the local association is a part, in the latter case both the name of the local association and the district exchange usually appearing on the package.

The fruit of the growers of an association may be handled as an individual account, but the usual method is to ship the different grades of fruit of all the growers under brands selected for each grade, the individual grower losing his identity so far as the market is concerned when the fruit enters the packing house and has been graded. In handling the fruit in this manner, the shipping season is divided [fol. 98] into periods varying from two to six weeks in length, and these periods are known as "pools." When a pool covers a month, it is referred to as a "January pool," "February pool," and so on. The members of the association are credited with the weight of each grade of fruit delivered and at the end of a pool receive the pro rata of the proceeds represented by the quantity of fruit delivered to the packing house during that pool.

The responsibility of the association or of the individual or firm that packs and distributes or sells the fruit for a grower usually begins when the fruit is delivered at the packing house. The association in a general way controls the time of delivery of the fruit of its members to the packing houses and the proportion of their crop that shall be delivered at one time, giving each member an opportunity to furnish his pro rata of fruit during the marketing season, based on the relative percentage of his crop to the holdings of the association as a whole. Previous to the beginning of the investigation by the Bureau of Plant Industry little attempt was made to exercise control over the conditions under which the fruit was harvested and delivered for packing, but during recent seasons much careful attention has been given to these important operations.

In most cases the fruit is picked by the owner or manager of a grove, or by labor under his direction, the labor being paid by the box or by the day. Frequently the fruit is picked and carted to the packing house by contract at a fixed price per box or rate per hundred pounds. Among the cooperative associations and individuals or firms shipping for growers or buying for cash, a system of gang picking is growing in favor as a mean of insuring greater uniformity in the condition of the fruit. A picking crew with a foreman

is employed by the officers of an association, for example, and the fruit of the members of the association is picked by this crew. Under this system only skillful workmen need be employed and very efficient work is secured when the labor is directed by a competent foreman. Some association packing houses that do not have a picking gang employ a picking inspector, who sees that the fruit delivered by different growers to the packing house has been carefully picked.

The most uniform results are secured when the same labor is employed continuously. Since two or three pickings of oranges are made from the same tree during a season, this condition is not always practicable on the average ranch when the picking is done by the owner. Usually the owner has to secure such labor as is available for each picking, and often can not employ the same set of men more than once. This is especially true where the help is secured through labor agencies. Under these conditions there has been a lack of uniformity in the condition of the fruit from different groves and from the same grove at different pickings.

[fol. 99] Among the laborers are found Americans, Japanese, Mexicans, Chinese, and a few of other nationalities. Experience has shown that the ability of the labor foreman is of more importance than the nationality of the crew in securing efficient work and that the general policy of those who employ the labor in respect to the care with which the fruit is to be handled is of greater importance than both.

Picking Citrus Fruits

In picking citrus fruits it is necesary to sever them from the branches with sharp clippers or shears. The fruit is then placed in a picking bag holding from 20 to 50 pounds, slung over the neck and shoulders of the picker. From this it is emptied into picking or lug boxes, and in these the oranges are delivered to the packing house. Sometimes the packing or shipping boxes are used for this purpose once before shipment. Formerly the most common type of shears in use was a small one with sharp-pointed, curved blades, shown in figure 1, A, which, when not handled with care, often punctured or cut the skin of the orange. Since greater care and attention have been given to the operation of picking, many new styles of clippers have been invented

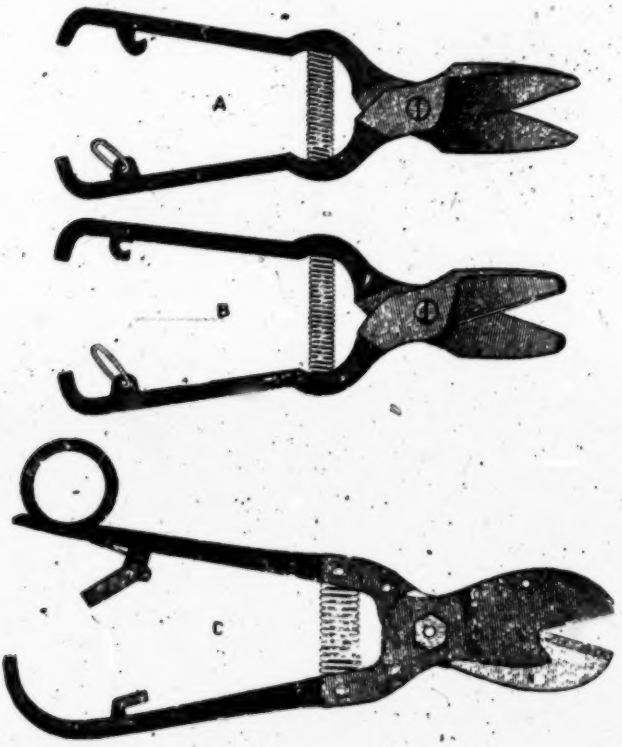

Fig. 1.—Types of shears or clippers used in picking citrus fruits. A, a sharp-pointed type; B, clippers with blunt points; C, sheath clippers.

and put into use, most of them with rounded or blunt points. Blunt-pointed clippers are shown in figure 1, B, and another style, known as sheath clippers, in figure 1, C.

[fol. 100] Packing Citrus Fruits

The packing houses are located either on the ranches or at the shipping stations, usually at the latter points. Some of the large corporations and a few individuals have the fruit packed in houses on the ranch, but the association houses and those of the other types of shippers are generally placed alongside the railroad at the shipping point.

The houses vary in capacity from 1 to 15 carloads of fruit a day. The capacity of all the packing houses in California is said to aggregate from 400 to 600 cars a day, though the daily shipments do not average more than 150 cars during the main shipping season. In no other fruit industry have

the appliances for handling the fruit in the packing house been so highly developed. The average orange packing house is equipped with box-making machines which nail together the boxes used for carrying the fruit to market; specially constructed hand trucks for moving several picking or shipping boxes at a time; hoppers for receiving the fruit; washing tanks and scrubbing machines to remove the sooty-mold fungus, and drying racks in those sections where the fruit has to be washed; elevators to carry the fruit to the grading and sizing machines, drying racks, and other places; carrying belts or chutes; automatic weighing and recording scales for weighing the different grades of fruit of each grower; series of padded bins, sometimes with self-adjusting bottoms, for receiving the different sizes of fruit; belts to carry the packed boxes; presses for covering the boxes; and sometimes a system of fans to assist in drying the fruit, and a machine to wrap the fruit automatically. All of the stationary machinery is run by power, making the interior of a large packing house in operation resemble the interior of a complex factory.

There is a wide variation in the type and arrangement of the different kinds of machinery. A general idea of the steps through which the orange passes may be gained from the following brief description of a common type of house. The fruit is dumped from the field boxes into the hopper (see Pl. IV, figs. 1 and 2), which leads to rapidly revolving brushes (Pl. IV, fig. 1) which clean the fruit. From the brush the fruit is elevated to a sorting or grading table or grading belts, figure 2, where is passes before the grader and is sorted into two or more grades by hand. Each grade then runs by gravity or on belts through an automatic weighing machine (Pl. V, fig. 1), where the weight of the grades of each grower is recorded, to the long sizing machine (Pl. V, fig. 2), and from there, in various ways, to the packing bins seen in Plate VI. If the fruit is to be washed, it is first dumped into a tank of water; then run between brushes submerged in the water (Pl. VII, fig. 1) or with [fol. 101] water running over them; then elevated or run to drying racks (Pl. VII, fig. 2) or under a blast of air, after which it is usually run through all the steps described for brushed fruit, or the hopper and brush may be left out and the oranges delivered to the sorting table. There is a wide difference in the simplicity or complexity of arrangement of

the packing houses and a similar variation in the speed with which the machinery is operated. A complex, undesirable type of house is shown in Plate III, figure 2, while a simpler and desirable arrangement of the machinery is shown in Plate VI.

The packing of the fruit is done by men or women, the laborer being paid usually by the box, though sometimes by the day. The packers average from 40 to 100 boxes for a day of ten hours.

Fig. 2.—Grading belts used in assorting oranges.

The grading of citrus fruits is based on the general texture of the skin of the fruit, on its appearance as influenced by scars, and on the general form and style of the fruit. The grades have no reference to the size of the fruit. There are usually three grades packed—"Fancy," "Choice," and "Standard." Some packers also have so-called "Extra fancy" and "Extra choice" grades. A "Fancy" orange is supopsed to have a deep orange color, to be normal in form, fine in texture with freedom from blemishes, and heavy and juicy. A "Choice" orange is supposed to have good color and good but not the finest texture. It may have a few blemishes. It should be free from frost damage and should be reasonably heavy and juicy. A "Standard"

orange may be quite badly scarred or discolored, coarse in [fol. 102] texture, and irregular in form, but should be merchantable shipping stock. Many frozen oranges are shipped as "Standards." A fourth grade, "Culls," is sold to the peddlers from the packing houses and is sometimes shipped to near-by markets. Many of the shippers are discarding the "Fancy" and "Choice" grades and pack a grade called "Orchard run," which represents the fruit of the orchard with the "Standards" and "Culls" out. The grades are usually shipped under brands which are selected for the different grades and not under the designation "Fancy," "Choice," or "Standard." The name "Orchard run" is frequently used as a brand designation for that grade.

Each grade of oranges is divided into sizes, the extreme range of sizes varying from 48 to 420 oranges to the box. The most desirable commercial sizes of the Washington Navel variety are in boxes containing 150, 176, 200, and 216 oranges. A standard box of California oranges is 12 by 12 by 26 inches outside measurement, divided in the middle by a partition, with an inside fruit space of 11½ by 11½ by 24 inches. A box of oranges is estimated to weigh 72 pounds.

A car of Washington Navel oranges, so far as the sizes are concerned, may contain boxes of all of the sizes. A car is called a "standard car" when it contains not more than 10 per cent of each of the following sizes—96, 112, and 250, and not over 20 per cent of the 126 size. The remainder of the car may be divided among the 150, 176, 200, and 216 sizes. If a car is sold to a dealer at a fixed price per box, it is usual to allow a discount of 25 to 50 cents per box on the excess in the 96, 112, 126, and 250 sizes, and a discount of 50 cents per box on the 48, 64, 80, 288, 300, 324, 360, and 420 sizes. The rule regarding the sizes in a standard car may vary with the season, with the section, and with the general size of the fruit taken as a whole. When oranges of either the large or small sizes are scarce they are at a premium, and the proportion in a car may be raised without discount.

Shipping Citrus Fruits

The citrus fruits of California are distributed to markets throughout the United States and Canada, and to a limited

extent to European and other countries. They are shipped under a specially organized refrigerator-car service. From November to the middle of March, during which period about one-half the crop is moved, the weather in California and throughout the territory en route to distributing points is cool and shipments are made under ventilation without ice, the ventilation of the cars being regulated by the railroad under instructions from the shipper. After the middle of March cool weather in California or in transit can not be relied upon and ice is quite generally used for

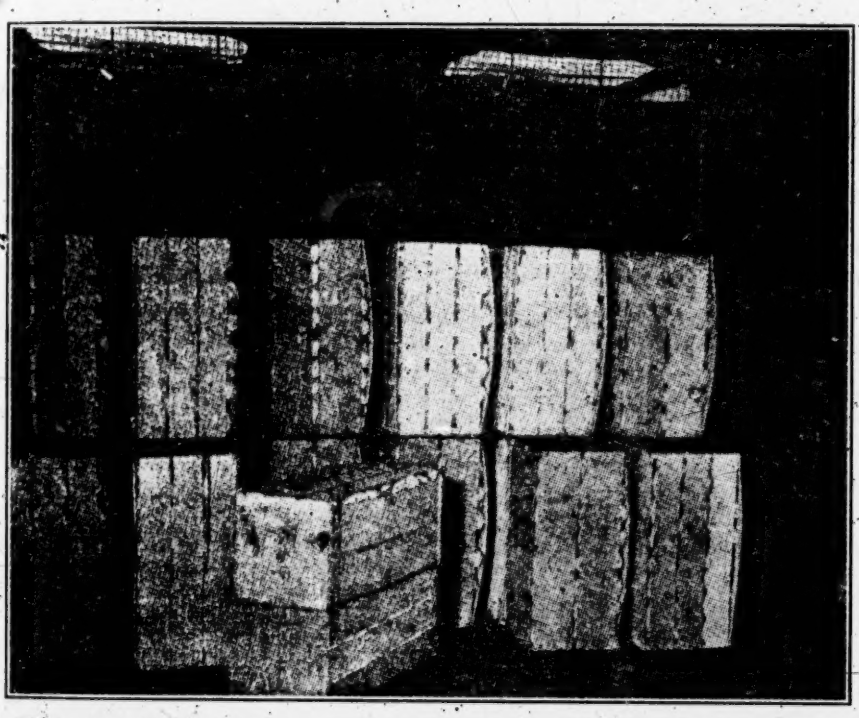

Fig. 3.—Boxes of oranges in a car, showing the standard method of loading.

refrigeration, though some shippers forward the fruit [fol. 103] much later under ventilation. Early in the season, especially during January and February, when the fruit is packed in a cool condition, it may be frozen in transit unless special precautions are taken to protect it by insulating the car with building paper or other materials, by raising the boxes on strips above the floor, and by regulating the ventilators carefully according to instructions.

Occasionally, after the middle of March the fruit may be loaded at a temperature of 80° to 100° F., but a large proportion of it is packed at a temperature not above 65° F. even as late as the first of June.

A standard car 40 feet in length usually contains 384 boxes of oranges loaded two tiers on end and six rows wide, as shown in figure 3. The boxes are billed at an estimated weight of 72 pounds each. The minimum freight weight of a car over 37 feet in length, outside measurement, is 26,700 pounds. The minimum freight weight of a car 37 feet or less in length is 24,190 pounds. The freight rate varies from $1.12½ to $1.50 per hundred pounds when shipped in carload lots. To most points on the Missouri River and eastward there is an emergency rate of $1.15 per hundred pounds in carload lots, effective since March 11, 1907, the former rate being $1.25 per hundred pounds.

[fol. 104] In 1907, when there was serious shortage in the supply of cars, many were loaded seven rows wide on the bottom tier and six wide on the top tier as a temporary expedient, thereby increasing the customary load an appreciable amount.

Each of the two ice bunkers of a refrigerator car, one at either end, holds from 2 to 2½ tons of ice. The first icing of the cars is done at various assembling points in California after the fruit is loaded and reicing in transit follows as needed. The average time in transit from southern California points to New York is twelve to fifteen days, and to Chicago from nine to eleven days, the time, in general, depending on the condition of the transportation business of the western railroads and their connections. The carload rate on refrigeration is based on the section of the country into which the car is shipped and the weight of fruit in a car. The rate to Chicago, for example, on a car of 24,190 pounds is $54.67 and to New York $65.61. The rate on a car of 27,650 pounds, which is the weight of a standard car of 384 boxes, is $62.50 in the former case and $75 in the latter.

The Investigation of the Causes of Decay

The investigation by the Bureau of Plant Industry was begun as the result of the efforts of Mr. J. H. Reed, an orange grower of Riverside, Cal., who, on account of the interstate nature of the problem, endeavored to induce the

Department of Agriculture to undertake this work. In the winter of 1903-4 a preliminary survey of the orange industry was undertaken to make plans for this investigation. The causes of the decay were not understood, but a multitude of theories were advanced by growers and shippers to explain it. Some attributed the decay to the influence of the type of soil and to other conditions under which the fruit was grown; to a possible degeneracy in the fruit as the trees grew older and to climatic conditions, such as frequent fogs and rains. The decay was thought by many to be especially related to a supposed inherent weakness of the fruit during the blooming period of the trees, which occurs during the picking season. Other believed it to be due to methods practiced in the packing houses; while nearly all were more or less agreed that a large part of the loss was chargeable to inadequate or improperly handled transportation facilities. The decay entailed a heavy loss on the shipper, it was detrimental to the reputation of the industry, and it led to difficulties of various kinds between all parties concerned in the handling and transportation of citrus fruits.

The preliminary survey in the winter of 1903-4 showed that the decay was more troublesome in some regions than in others, that it was worse in some packing houses than in [fol. 105] others in the same region, and that it usually increased in severity as the season advanced. Continual observations on many of the popular and supposed causes did not give promise of a satisfactory explanation, but it was noticed from the beginning that there was a close and constant relation between the various methods of handling the fruit and the development of decay.

The Blue Mold of Citrus Fruits

The common blue-mold fungus was always found to be associated with decaying oranges, as was observed in 1905 by Woodworth.* This fungus grew within the tissues of the fruit and caused a breaking down of the structure, which rapidly produced a soft decay of the entire fruit. Two distinct kinds of growth were constantly found. The most common grew rapidly in a rather indefinite area over the orange, producing a mass of olive-green spores, with a large

*Woodworth, C. W. Orange and Lemon Rot, Cal. Agr. Expt. Sta. Bul. 139.

area of white mold extending beyond the spores and producing a semisoft condition of the fruit. The growth of the second was much slower and in a more definite area, and the spores were bright blue in color, though in other respects this fungus was similar to the first.

Both fungi have been determined as species of Penicillium. While a distinct difference can be seen in the growth of the two in producing decay in the orange, it has been difficult to separate them morphologically. Penicillium glaucum has been generally considered the most common of the mold fungi. Yet, on the orange the rapid-growing, olive-green fungus is referred to as Penicillium digitatum, and the slow-growing, bright-blue species as P. glaucum.[a] The more common form is shown in Plate I, frontispiece. The spores are produced in countless numbers on the decaying fruit, of which there is always more or less in the groves and in and around the packing houses. They are on the fruit, on all the machinery, and floating in the atmosphere, and they germinate easily and quickly wherever the conditions of heat and moisture are favorable.

That there might be no question about these molds being the cause of the decay, large numbers of fresh, sound oranges were inoculated both in the field and the laboratory with spores of these species, and without exception the characteristic decay resulted.

These fungi had always been considered as saprophytic—i. e., capable of growing only upon dead organic matter—and from previous investigations with apples in storage it [fol. 106] had been determined that fungi of this group were apparently incapable of penetrating the unbroken epidermis of a healthy fruit and causing decay.

Upon careful examination of a large number of oranges in which the rot was just starting, it was seen that the area of decay in most cases was around a place where the epidermis

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[a] Smith, Ralph E. The "Soft Spot" of Oranges. Botanical Gazette, vol. 24, p. 103.

Smith, Ralph E., et al. The Brown Rot of the Lemon. Cal. Agr. Expt. Sta. Bul. 190.

had been previously injured by a cut or abrasion of some kind. Not all fruits in which the epidermis had been injured showed decay, nor could the decay always be traced to an abrasion in the skin. Injured fruit that was exposed to a free circulation of air did not usually develop a large amount of decay. The moving air quickly evaporated the moisture which accumulated in the injured tissue, making conditions unfavorable for the germination of the mold spores and the subsequent development of decay.

The effect of different kinds of cuts and abrasions on the fruit appeared important. A slight puncture or the removal of bits of the epidermis by scratches or by shaving it with the picking shears would frequently dry before spores could germinate and become established. A deeper wound, especially in the body of the fruit, where the skin is thin, would usually fill with juice and provide ideal conditions for rapid decay. It was noticed that decay did not develop in these slight wounds, while it was almost sure to develop in the deeper wound unless the fruits were held in an unusually dry or cold atmosphere.

These observations were followed by a series of laboratory studies by Mrs. Flora W. Patterson, Mycologist of the Bureau of Plant Industry, who found that the blue-mold fungus did not have the power of penetrating the epidermis of a sound, healthy orange even under conditions of heat and moisture that were most favorable for the growth of the fungus. Practical applications of these laboratory tests were made with oranges under ordinary packing-house conditions. Without puncturing the skin, the mold spores were placed on the surface of oranges which had been delivered at the packing house in the usual commercial way and were apparently sound. This fruit was held for one or two weeks in the house, where conditions were favorable for the germination of the spores and for the development of decay, and then examined. It was rare to find that decay had developed at the point where the blue mold had been placed on the fruit. Decay, however, sometimes developed where no mechanical injuries were visible. In these cases, the mold probably entered the skin through injuries caused

by the punctures of insects, by the dropping of the fruit, or through other injuries not discernible.

The power of the fungus to grow in healthy oranges in commercial cold storage has been tested by inoculating fresh [fol. 107] fruits with the mold spores in a puncture through the epidermis and placing them at once in a temperature of 32° F. or less. Decay had not developed in two months, when the tests ended. When the decay is established and developing in an orange, it does not appear to be entirely checked when placed in a temperature of 32° F., though the development is greatly retarded.

Mechanical Injuries Related to the Handling of Oranges.

In the spring of 1905 a systematic series of observations and inspections was inaugurated to determine the amount and severity of mechanical injuries of oranges when delivered at the packing houses and the relation of the methods of handling the fruit to these injuries.

This was accomplished by a close inspection of many thousand fruits in a large number of packing houses and groves in different sections, and included an examination of the oranges of different growers delivering fruit at the same house and of the work of different pickers working in the same grove.

It was soon discovered that fresh mechanical injuries could be seen on a considerable proportion of the fruit. The most common type of injury was made by the point of the clippers in cutting the oranges from the trees. In some cases deep gashes had been cut into the skin, in others the skin had been shaved or sliced off in areas varying in extent, while in still others the injury was so slight as to be hardly perceptible. Many of the oranges were severely injured by stem punctures, which are produced when an orange cut from the tree with a long stem is allowed to fall or roll forcibly against another fruit, while others showed scratches of various kinds and punctures from thorns. Other common forms of injury occurring in the groves were punctures and bruises from gravel and twigs in the bottom of the picking boxes and cuts in the skin caused by the finger nails of the pickers. Frequently bruises were found that could be traced to rough and careless work in loading

and carting the fruit from the groves to the packing house and in unloading. It was found that there was often a wide difference in the amount of this injury in the fruit delivered by different growers to the same packing house, and there was as great a variation in the condition of the fruit in different picking boxes coming from the same grove. Very often there was considerable injury that could be traced to some incidental derangement in the packing-house machinery, such as a broken wire in a wash tank, a protruding screw among the bristles in the brushing machines, a nail or bolt extending into a chute or runway, or some other similar defect. (See Plate I.)

[fol. 108] A large number of records of these different types of injuries has been secured during the past three years. It is not possible to include these records in full in this publication, but the following representative statistics will give an idea of the extent of this trouble.

The Extent of the Mechanical Injury of the Orange

In 1905 the average amount of mechanically injured fruit, based upon a careful inspection of more than 40,000 oranges during January and February, was 17 per cent. On February 27, 1905, a circular was issued calling attention to this injury and its relation to decay and suggesting methods whereby it could be reduced. Apparently the growers were quick to adopt ways of reducing the injury, for after the 1st of March it did not exceed 7.5 per cent—an immediate reduction of nearly 10 per cent.

The accompanying chart (fig. 4), computed from the data of 1905, shows the variation in the amount of injury in the fruit found in ten different packing houses.

The chart shown as figure 5, page 25, also computed from the records of 1905, shows the variation in the amount of injury in the oranges of ten different growers who delivered and pooled their fruit together in the same packing house.

The fruit of an individual has sometimes shown 50 per cent or more of mechanically injured oranges.

[fol. 109] The variation in the quantity of fruit injured by ten different pickers in the same grove is brought out in figure 6 (p. 26), computed from the records of 1905.

Occasionally pickers have been found who have injured from 50 to 75 per cent of the fruit they picked.

A large quantity of fruit has been examined in the bins and packed boxes in many packing houses to determine whether the oranges that are injured are seen and removed by the graders, as it was generally maintained that this was done. Figure 7 (p. 27) shows the percentage of injured fruit in ten representative lots.

It was an exception to find a grader who could see and throw out an orange showing a slight mechanical injury. It is probable that 95 per cent of the fruit injured in handling is included in the packed fruit.

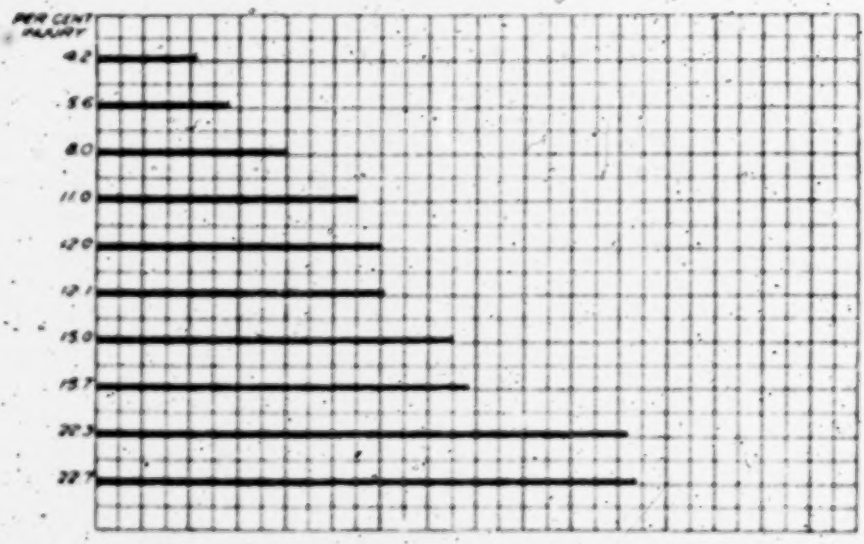


Fig. 4.—Diagram illustrating the average amount of mechanical injury in oranges in ten packing houses.

Growers and Packers Not Aware of the Extent of Mechanical Injury

The most experienced growers and packers were not aware of the extent to which the orange was injured in handling, nor did they appreciate the effect of a slight bruise or abrasion on the keeping quality of the fruit. In a general way, it was known that an orange with a punctured skin was likely to decay, and the need of handling the fruit carefully was discussed abstractly but with little appreciation of the importance of careful handling to the preservation of an

[fol. 110] orange. The greatest amount of injury was frequently found in the fruit of individuals who were skillful growers and who gave careful attention to all the necessary details of production, but who did not know or understand the importance of careful picking. The same failure to appreciate the importance of care in handling was even more pronounced in the case of the laborers who did the picking. They did not know they would cause the decay of the fruit by cutting the skin or allowing it to drop into the picking sack, or that they were actually causing so much injury to the fruit.

Since it was desirable to have all the persons interested realize the large quantity of fruit that was injured by handling, the inspections of the oranges in the groves and packing houses have been made in full view and with the co-

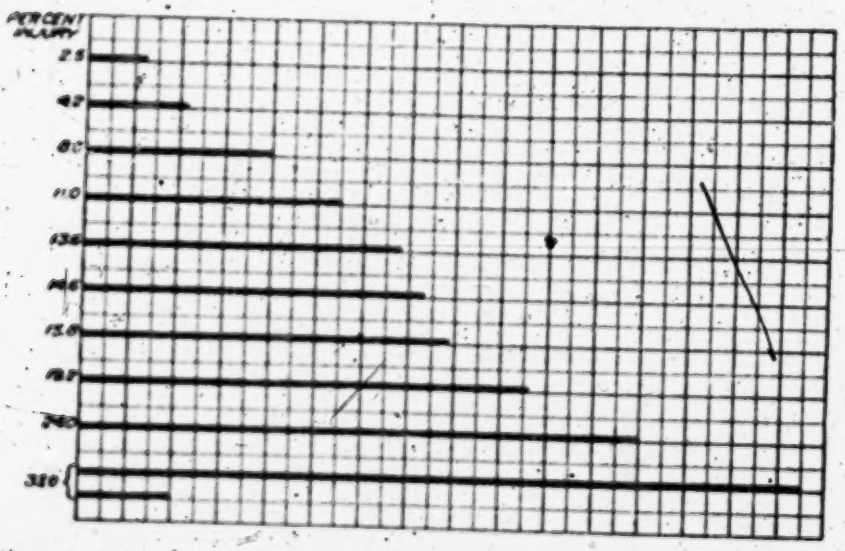


FIG. 5.—Diagram illustrating the average amount of mechanical injury in oranges of ten growers who pooled their fruit

operation of the most interested growers and packers. The relation between an injury to an orange and the chance of decay during shipment is now generally understood by growers and packers, largely as a result of these demonstrations.

As a result of this understanding, it is now accepted without question that the elimination or reduction of the me-

chanical injury of the orange in handling is one of the largest problems that the California citrus-fruit grower and packer have to overcome. A determined effort is being made to reduce the trouble, and abundant data have been accumulated to show that by using care in the instruction and supervision of labor not more than 2 or 3 per cent of the [fol. 111] oranges will be injured in handling the fruit on a large commercial scale.

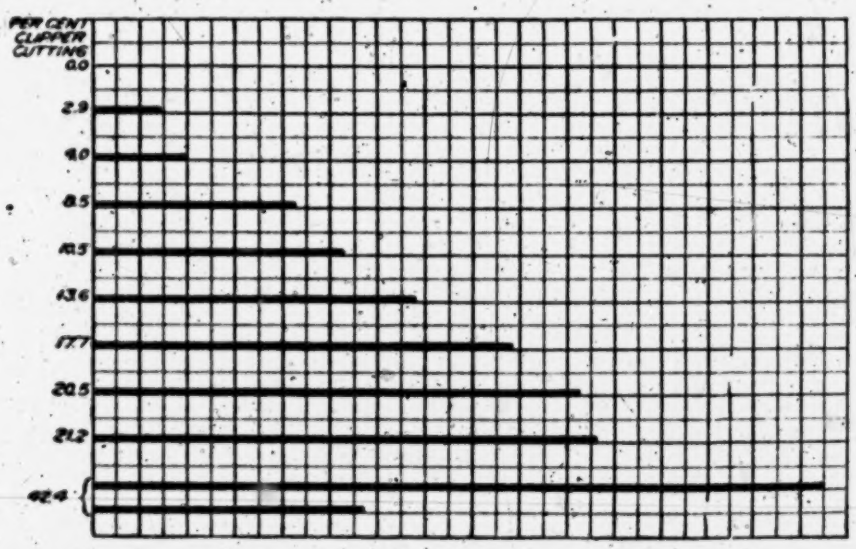


FIG. 6.—Diagram illustrating the average quantity of fruit cut by ten pickers in the same grove

The following data are presented to show that it is practicable to handle the orange without mechanical injury to the fruit. These figures show the result of 10 inspections of fruit from 1905 to 1907, inclusive, of a corporation handling several hundred acres of groves. The first inspection was made before the circular of February 27, 1905, was issued.

Percentage of mechanical injury to fruit found in a large orange grove at each of ten inspections during 1905-1907

First inspection	Second inspection	Third inspection	Fourth inspection	Fifth inspection	Sixth inspection	Seventh inspection	Eighth inspection	Ninth inspection	Tenth inspection
15.8	2.6	0.4	1.1	1.2	3.3	5.5	0.3	3.0	0.0

The Injury of the Fruit an Economic Problem

After a careful study of the problem for three years, it is evident that the mechanical injury of the orange is partly inherent to the handling of a perishable crop, but that it is primarily related to the economic and social conditions surrounding the citrus-fruit industry. It is related to the large volume of business handled by growers and packers, to the character and quantity of the labor available, to the sys-

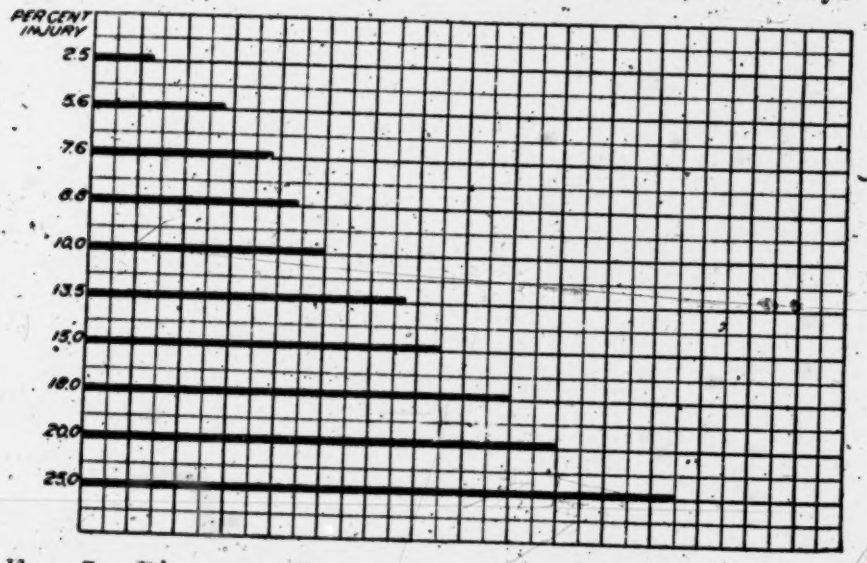


FIG. 7.—Diagram illustrating the average quantity of injured oranges found in bins or packed boxes

tem of handling the labor, to the details of packing-house management, to the aim of the association and packer who [fol. 112] handles the fruit, and to the effect of sharp competition between those who handle the California citrus-fruit crop.

The industry has reached its present condition through gradual development. The one factor in this growth that stands out with prominence as a fundamental cause of careless handling is the effort to handle large quantities of fruit at the lowest possible cost. By having the fruit picked and packed by the box and by having other operations performed on the same principle, there have been developed labor methods, packing-house equipments, and systems of business practice that place a high premium on the quantity

rather than the quality of the work accomplished. The payment of labor by the box has developed a class of pickers whose chief aim is to pick the greatest possible number of boxes. It is not unusual to see the professional picker, with a hoop fastened in the top of the picking sack to hold the mouth open, with a deft movement of the clippers cut the oranges and shoot them directly into the bag. Such effort led to the use of sharp-pointed clippers, or shears (fig. 1, a), which the picker could handle with great facility. It has developed the type of packing-house equipment shown in Plate III, figure 2. It is responsible for overcrowding the capacity of the average packing house, for the excessive speed of machinery, and for a general feeling among growers and packers that the continuous reduction in the fixed charges in the handling of the crop in California from year to year is an essential in successful orange handling. It is a common occurrence for a grower to change the agency for handling his fruit to another that will do it for a fraction of a cent a box less, the immediate saving being the factor that determines his action. There is an equal rivalry between the packing houses to reduce the cost of handling the fruit, and a similar desire to have it sold at the lowest charge for handling.

A Reduction in the Cost of Handling a Perishable Product Not Always Justifiable

The tendency to reduce the cost of producing and handling a crop is commendable from a business point of view. Probably no other fruit industry has reduced the necessary cost of handling and marketing the crop to such an extent as the citrus industry, largely as a result of the effective cooperative organization of the fruit growers. But in the handling of a perishable commodity it is false economy to reduce the cost of an operation if the change is detrimental to the keeping quality or attractiveness of the product. A laborer who picks 100 boxes of oranges a day at 3 cents a box, cuts 25 per cent with the clippers, and drops the fruit several feet into a bag is more expensive to the grower than one who picks 40 boxes for $3 but places the [fol. 113] fruit in the picking boxes in sound condition. It is equally false economy to have the oranges packed at low cost in a house where the handling of the fruit is so rough

and complicated as to make it susceptible to decay before it is loaded for shipment. The real economy of reducing the cost of an operation is determined by the effect on the keeping quality of the product. Every reduction that is made at the expense of the shipping and keeping quality of the fruit is not a saving to the industry, but in the end acts as an increase in the cost of handling by reducing the value of the fruit. Later in this bulletin it will be shown that the highest net returns in the citrus industry have followed an increased cost to insure a more careful handling of the product.

A Weak Point in the Present Method of Handling the Orange

There is another factor related to the cooperative method of handling, as well as to the method of handling the fruit by buyers and shippers, that is responsible for a large amount of rough handling. Neither the association, the shipper, nor the buyer can insure the careful handling of fruit where the picking and hauling are in the hands of the growers or of their representatives. In a general way, the packing association or shipper can advise the grower how to pick and haul the fruit, and lots of fruit that have been grossly mismanaged may be rejected; but it is impossible to insure a uniform condition in the fruit of different growers under these conditions, there is little incentive for the grower to handle his fruit with unusual care if it is to be pooled with the fruit of other growers who handle it carelessly. The tendency is for all growers to handle the fruit with but average care and for the careless grower to depend on a higher average handling by others to overcome the shiftless methods on his ranch. It is the tendency also for the average grower whose fruit is packed and sold for him by a dealer or agent to reduce the cost of picking and hauling the fruit to the packing house to the lowest possible figure, and if the fruit decays as a result of this bad handling to attribute it to the methods employed by the dealer or agent in packing and selling the fruit. A cooperative association or a dealer who handles the fruit for the growers either under a pooling system or for individual account needs to establish a standard condition

as to freedom from mechanical injury of the fruit that enters the packing house and to provide a practical method of enforcing the requirements.

Methods of Insuring a Uniform Condition of the Fruit

There are at least two methods that may be adopted as a means of insuring a uniformly small percentage of injury in the fruit of different growers. The first is the picking [fol. 114] of the fruit by gangs of laborers under the control of the packing-house management. A number of cooperative associations and independent shippers have recently adopted this method of handling the fruit. The success of this plan depends on the cooperation of the growers, a tactful and efficient labor foreman, and the strong support of the foreman by the packing-house management to the end that the fruit may be picked carefully and economically. If the growers do not accept this plan cheerfully, if the picking foreman is inefficient, or if the packing-house management insists on reducing the cost of picking without regard to the effect on the condition of the fruit, such a system is doomed to failure.

A second, though less certain, means of securing a uniform condition of the fruit is by a system of inspecting the fruit in the groves and as it comes to the packing houses, in order that the persistently careless picker and grower may be located and advised as to the means of reducing the injury, and finally eliminated if his fruit does not reach the required standard. This system has already been adopted by a number of association houses and by a few independent shippers.

Experiments with Different Methods of Handling Oranges

The experimental investigation of the causes of decay in oranges has been conducted with a view to determining the following points: (1) The comparative susceptibility to decay of oranges handled in different ways for shipment after holding the fruit in the packing houses in California about two weeks; (2) the comparative susceptibility to decay of oranges handled in different ways for shipment when forwarded to New York under ventilation, icing, and pre-

cooling; (3) the comparative susceptibility to decay of oranges handled in different ways and shipped under different conditions, the decay being determined at intervals during a storage of the fruit in a common storage room in eastern markets.

Technical investigations in refrigeration, including the development and testing of various methods of cooling the orange for shipment and a determination of the changes in the temperatures of cars during the transcontinental trip when shipped under different methods, such as ventilation, icing, and precooling, have also been made.

The Experiments with Oranges Stored in Packing Houses

The primary object of the experiments with oranges stored in packing houses was to determine, under conditions that permitted the growers and packers to see the results, the comparative susceptibility to decay of fruit that [fol. 115] had been handled in different ways. A secondary object was to determine the comparative amount of decay in oranges handled similarly in different regions of the citrus fruit belt.

The method of conducting these experiments was to select a quantity of apparently sound oranges from the picking boxes just as they were received from the grove, designating this lot as "unbrushed;" another lot of apparently sound fruit that had been run through the brushing machine and selected from the packing bins was designated as "brushed;" a third lot selected from either the drying rack or the packing bins, or that had been especially washed, was designated as "washed," and a fourth lot, in which each orange showed a visible injury, such as a clipper cut, punctures of various kinds, or other abrasions, was designated as "mechanically injured." In 1907 a comparison was made between the amount of decay of oranges washed in clean water and fruit washed in dirty water, similar to that used in commercial washing, or in clean water in which some blue mold spores had been mixed. Several boxes of fruit of each lot were packed at one time and the fruit was left in the packing house for about two weeks, when it was examined for decay in the presence of growers and shippers.

These experiments were started in 1905 in 6 houses. In

1906 they were carried on in 15 houses and in 1907 in 31 houses. The experiments were usually begun in January and extended into April.

The work of the three years has shown that the orange as it comes from the tree in sound condition seldom develops decay and that brushing, washing, and the mechanical injury of the fruit in handling are followed by more or less loss, the greatest decay developing in the mechanically injured oranges.

The following table gives the average decay in the different lots of fruit in the three years. The data of 1907 appears also in figure 8, page 32.

TABLE I.—Average percentage of decay found in oranges subjected to various methods of treatment and in various conditions, held in packing houses in 1905, 1906, and 1907.

Year	Treatment or condition of oranges				
	Unbrushed	Brushed	Washed in clean water	Washed in dirty water	Mechanically injured
	Per cent	Per cent	Per cent	Per cent	Per cent
1905	[illegible]	[illegible]			[illegible]
1906	[illegible]	[illegible]		[illegible]	[illegible]
1907	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

It should not be inferred from these figures that the unbrushed fruit in 1906 was less susceptible to decay than in 1905 or 1907. The fruit used in the experimental work was selected not by microscopic examination, but by an in- [fol. 116] spection not more critical than a careful fruit grader could make. The fruit that appears to be sound may nevertheless be bruised to some extent, and although the bruises are not easily perceptible they are severe enough to be followed by the blue mold decay. The inspection in 1905 was probably not as critical as the work that followed, on account of the comparative inexperience of the Department representatives. The important principle underlying these figures is that an apparently sound orange when it comes from the tree shows greater resistance to decay than the same fruit after it has been handled in different ways, that the fruit showing visible mechanical injury as a result of handling develops the maximum decay, and that the brushing and washing of sound oranges is more or less detrimental to their keeping quality.

Aside from these experiments, a number of comparisons have been made to determine the effect of dropping an orange 18 inches into the picking box. The data along this line are not extensive or conclusive, but they show that under some conditions the decay may be considerably increased by dropping the fruit a small distance.

THE DECAY IN ORANGES IN DIFFERENT SECTIONS.

The impression is general among growers and shippers in California that there is a wide difference in the inherent

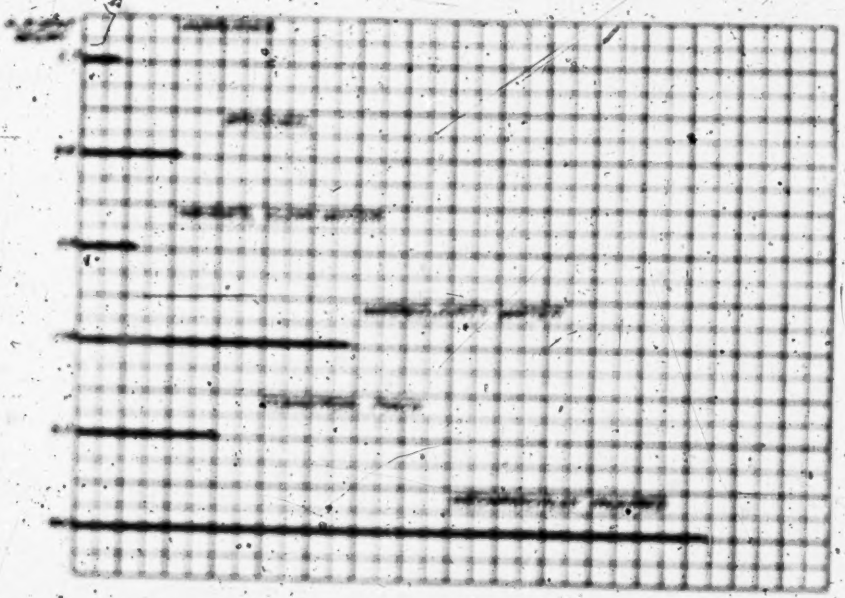


FIG. 4.—Diagram illustrating the percentage of decay in oranges held in packing houses, 1907.

keeping quality of the oranges of different sections. The fruit from the upper San Bernardino Valley, for example, is usually said to have better shipping qualities than the [Bul. 71] oranges grown in the more humid regions near the coast. As a matter of fact, the average condition of the fruit of these two regions on arriving in market probably conforms to this general impression. The results of the packing-house tests already referred to indicate that the difference in shipping quality is due more to the conditions under which the fruit is handled in these sections than to the inherent character of the fruit itself. By com-

paring the experiments conducted in a group of houses on the coast with those in a group in the upper San Bernardino Valley, the following average result appears:

Table II.—Average Percentage of Decay Found in Oranges in Different Sections of Southern California Subjected to Various Methods of Treatment and in Various Conditions.

Locality where grown	Treatment or condition of oranges				
	Not brushed	Brushed	Washed in clean water	Washed in dirty water	Mechanically injured
	Per cent	Per cent	Per cent	Per cent	Per cent
Upper San Bernardino Valley	3.0	4.9	4.7	23.1	36.0
Coast region	3.1	9.1	5.2	16.2	51.1

There is practically no difference in the decay in the unbrushed fruit in the two regions. This shows the keeping quality of the sound fruit just as it comes from the tree. There is some difference in the brushed fruit, as the same types of brushes are not used in both sections, nor are the brushes always handled with equal care. When the fruit is washed in clean water the results are similar, the condition of handling in this case being similar and comparable. There is some difference in the decay in the mechanically injured fruit and in the oranges washed in dirty water, as the nature of the injury and the amount of blue mold in the dirty water were probably not comparable. These differences in decay are no greater than commonly occur in different experiments in handling the same type of fruit in the same house.

In order to compare the influence of the brushing of the fruit under similar conditions, the tests in the houses in each section using the same kind of brush have been brought together. In the upper valley the decay from brushing the fruit was 4.9 per cent and in the coast region 4.3 per cent, or practically the same result. The packing-house tests indicate that an orange with a sound skin is not more likely to decay when grown in the coast region than a similar orange grown in other parts of the orange belt and that a similar line of handling produces similar results in the different regions.

The difference that occurs in the amount of decay in different regions or in different houses in the same region is

[fol. 118] due primarily to the conditions under which the fruit is handled. In the coast region in the past a large part of the fruit has had to be washed, while the fruit of the upper-valley districts has been shipped in a dry-brushed or unbrushed condition. Since these investigations were begun, the representatives of the Bureau of Plant Industry have had occasion to look into the conditions in many sections where the fruit developed unusually large amounts of decay. In every case the cause of the trouble has been found to be due to the conditions under which the fruit has been handled, including the influence of such matters as the care with which the scale insects are held in control in the groves, the business capacity of the directors of the association, the ability of the packing-house foreman, the system of handling labor in the groves and packing houses, the efficiency of the labor, the sanitary conditions in the packing houses, and the kind of packing-house equipment. Wherever these conditions have been bad a section has acquired the reputation of producing fruit that has poor shipping quality, and wherever these conditions have been favorable to the proper handling of the fruit there has been no trouble with its condition on arrival at destination.

By these remarks it is not intended to convey the impression that the fruit of all sections is alike. There is the widest difference in the quality, in the time of maturity, and in the color of oranges of different sections and in different groves in the same section. There is probably a good deal of difference in the susceptibility of the fruit of different regions to bruising, as there is a wide difference in the texture of the fruit. What is intended to be conveyed is that there is no practical difference in the amount of decay that develops even in the tenderest oranges of a section when the fruit is handled with enough care to prevent bruising.

The Decay in Oranges in Different Periods of the Season

To determine the influence on decay of picking the oranges at different times during the season 20 boxes of the Washington Navel were carefully picked about every ten days from January to May from a grove of the Arlington Heights Fruit Company, Riverside, Cal. The fruit

was held two weeks under conditions that were especially favorable to the development of rot. The decay in the fruit picked at different times is brought out in the chart shown as figure 9.

There was practically no difference in the amount of decay in the fruit at any time between January and May. The small amount of decay could usually be traced to mechanical injuries that were overlooked when the fruit was brought in from the groves, and the slight difference in the amount of decay at the different pickings could be [fol. 119] easily accounted for in this way. The trees were in bloom when the fruit was picked on March 23 and April 2.

The data from these tests are not extensive enough to be conclusive, but taken in connection with the other data accumulated they indicate that California oranges picked and handled with enough care to protect the skin from bruising are practically immune to decay, whether picked in a partially ripe or fully matured condition. In this connection the series of shipments of carefully handled fruit from February to May under ventilation, referred to on page 128 does not show an increase in decay as the season advanced.

It is popularly believed that the fruit is more susceptible to decay at the period just preceding and during the blooming of the trees. This belief does not appear to be well founded. The increase in decay that sometimes occurs in the shipments in February or March is probably related to rises in temperature in California at that time, causing the fruit to be loaded in a hot condition. There is often a period of hot weather for a few days each year at this

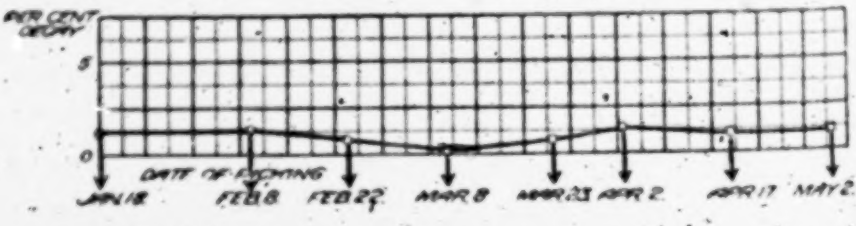


Fig. 9.—Diagram illustrating the percentage of decay in oranges picked at different times during the harvesting season, 1906.

time. The fruit is still being shipped under ventilation. The oranges that go forward at that time from the sections that handle the fruit roughly develop excessive amounts of decay. This may be followed by cooler weather or by the adoption of icing in place of ventilation, and the decay falls off. Whenever the weather remains cool throughout the shipping season there appears to be no unusual increase in the amount of rot at the blooming time.

An increase in decay usually follows an overcrowded condition of the packing houses or a temporary shortage in the supply of cars in warm weather. It may also be serious at the height of the harvesting season. Under the first condition the fruit is handled with less than the usual care and is made more susceptible to rot. Under the second the decay begins to grow in the bruised fruit while the oranges are standing in the packing house. Under the third condition the grower has to employ a large amount of unskilled labor, as there is not enough skilled labor to harvest the crop at the height of the season, and the fruit is delivered to the packing house in poor physical condition. [fol. 120] In the commercial shipments the decay is usually worse in April and May than it is earlier in the season, largely because the average temperature is higher, causing the decay to start quickly, and also because it develops more readily in ripe bruised oranges than in fruit that is bruised but immature.

The Curing of Oranges Before Packing

At the time the investigation described in this bulletin was begun, it was a common practice to hold oranges in a packing house a few days before packing. This practice was referred to as "curing." It consisted in the wilting or the evaporation of a small amount of moisture from the skin of the orange, thereby making it more pliable and easier to pack. It was considered necessary to wilt the fruit in order that it might be pressed into place in the packing box without injury and to insure the arrival of the package in market in a tight condition. It was believed that by packing hard, freshly picked fruit the curing or wilting would occur in the box, and the pack would arrive at destina-

tion in slack condition. A final claim for curing was that much, if not all, of the decay resulting from mechanical injuries would be sufficiently developed to be noticed and discarded by the graders or packers by holding the fruit in the house a few days before packing.

The general claims for curing have not been found to be well established. Early in the shipping season, when the oranges are immature and the skin hard, wilting or curing undoubtedly facilitates the packing of fruit. Later in the season, when the fruit is ripe, the curing does not appear to improve this condition, as the fruit is naturally pliable. The arrival of oranges in a slack condition in the box is not due primarily to packing uncured fruit. It is the result of packing the fruit loosely and poorly in the box. If each orange is pressed firmly into place by the packer, the fruit can be shipped at any time of year as soon as it is picked, and the packages will arrive in full, firm condition. The average packer does not take time to press each orange firmly in place, especially if the packing is paid for by the box. The packages are filled high and the cover press is expected to do the work that should have been done by the packer. The press, however, only makes the upper layers of the fruit tight in a loosely packed box. The fruit settles during the trip and arrives in a loose condition. These remarks are based on the fact that many of the leading shippers have packed the fruit within twenty-four hours after picking during the last two years without complaint as to the condition of the pack on arrival.

[fol. 121] It is not true, either, that the decay develops in the mechanically injured oranges during the curing period except in warm weather and in fruit that is most seriously injured. The decay may start to grow during this time, but it requires several days for it to progress far enough to soften the fruit and to be seen by a grader. The decay is less severe in the unpacked boxes than it is in the packed fruit, in which the moisture given off by transpiration is retained. If fruit can not be shipped quickly after picking it is better to leave it in an unpacked condition.

The curing of the orange does not appear to be detrimental to the shipping quality of sound fruit at any season, or to slightly injured fruit in cool weather. Early in the season it makes the fruit somewhat easier to handle by the

packer, but under the conditions pertaining to the commercial handling of the fruit in California it probably does more harm than good by allowing the decay to begin to grow in the mechanically injured fruit. If this fruit soon after picking is shipped under refrigeration or enters cool territory soon after picking, the decay may not start to grow.

The Brushing of California Oranges

The practice of brushing oranges grew up gradually in California. Practically all of the fruit was being either brushed or washed when the present investigation was begun. The fruit was brushed originally to remove the light coats of sooty-mold fungus or the dust that accumulates from the tillage of the groves in the dry season. The fruit was given a glossy appearance by the brushing similar to the artificial glossiness that is characteristic of the polished fruit sold from street stands. The shipper and the receiver finally considered it necessary to brush the fruit whether it was dirty or not, and brushing became established as a regular packing-house operation even in houses to which the fruit is delivered from the groves in a clean condition.

Several types of brushes have been developed in California. A kind commonly used is shown in Plate IV, figure 1. Some brush the fruit lightly, while the stiff fiber brushes or those not adjustable to fruit of different sizes may brush the oranges very harshly. In the packing-house experiments, the decay has often been raised from 10 to 40 per cent in small lots of fruit run through a brush of a harsh type or through a brush that was improperly adjusted. The injury from the brush generally arises from the inoculation of the mechanically injured parts of the skin with blue-mold spores that are attached to the bristles of the brush or by the actual puncturing of the skin by the bristles and inocula- [fol. 122] tion at the same time in the case of the harsh types or badly adjusted brushes. It is probable that light brushing is not injurious to sound oranges.

There is a wide difference in the quantity of dust and sooty mold on the fruit of different groves and in different seasons. All of the groves are comparatively free from dust during the rainy season, from January to April or May, and in groves that are well fumigated, and in most of those in the upper part of the San Bernardino Valley the fruit is practically free from the sooty-mold fungus.

It improves the appearance of an orange to have the dirt removed from the skin. It detracts from a moderately clean orange to have the natural bloom replaced by a gloss, and this altered appearance does not improve the selling value of the fruit. It is wholly unnecessary to brush a large part of the California crop, though it may be advisable to brush the fruit that grows on the rows along the highways, or to brush the entire crop after the rainy season is ended and the dust from the tillage of the land settles on the fruit. In Plate IV, figure 2, an arrangement is shown with a removable carrying belt placed on the box containing the brush. This belt carries the fruit from the hopper over the brush to the elevator leading to the sorting table. When a load of fruit requires it the belt is removed and the oranges are run through the brushes.

In 1906 the brushes were eliminated from two or three packing houses, and in 1907 at least a dozen houses, including those that shipped the brands which brought the highest prices throughout the season, forwarded the fruit without brushing.

The Washing of California Oranges

Oranges are washed primarily to remove the sooty-mold fungus that grows in the so-called honeydew exuded by the black scale (Saissetia oleae Bern.) The Valencia orange is sometimes washed to raise the grade by making the fruit clean and attractive, and the Washington Naval is occasionally washed with that end in view.

When the present investigation by the Bureau of Plant Industry was undertaken, from one-third to one-half of the oranges of California were washed, practically all of the fruit in some sections being treated in this way, especially where the growers had been overconfident in the parasite Scutellista cyanea Matsch or in the use of oil sprays as means of holding the black scale in check.

The honeydew from the black scale spreads out over the branches, leaves, and fruit, and in severe infestations the fungus which grows upon it makes the oranges black and unsightly. The fungus forms a thin skin-like covering over the orange which is removed by washing, or in light attacks by [fol. 123] brushing the fruit. A Valencia orange affected

with sooty-mold fungus and one free from the trouble are shown in Plate VIII.

The injury arising from washing the orange is primarily due to the water of the tank becoming infested with spores of the blue mold. These spores are carried into the mechanical abrasions of the skin by the water, under conditions that favor the growth of the fungus. The decay in washed fruit is also increased from the fact that the fruit is handled through a complicated system of tanks, brushes, elevators, racks, and other machinery which multiplies the chances of mechanical injury. A good deal of the fruit is packed before it is thoroughly dry, thereby making conditions of moisture favorable for the development of decay in the packed fruit. This condition arises during cloudy weather when there is not sufficient sunshine to perfect the drying and at times when the fruit is not delivered to the packing house fast enough to keep the packers supplied with dry fruit.

The water is always more or less infected with the spores of the rot fungus. They are found abundantly on the skin of sound oranges and in the dirt from the bottom of the boxes; in practice, also, decaying oranges frequently pass into the tank. This condition becomes aggravated when the water is not changed frequently. It is least objectionable when fresh water is constantly running through the tank or when the oranges are run through brushes with the water sprayed over them. In the average house the water in the tanks was not changed oftener than once in every day or two until 1907, when in many of the houses the water was kept running constantly through the tanks. It apparently is not injurious to the orange to wash it in clean water, provided it is handled carefully in other respects.

The necessity for washing the fruit should be avoided.—The necessity for washing the orange should be avoided by a proper fumigation of the groves with cyanide of potassium or by spraying, if it can be effectively done, rather than by treating the fruit in the packing house. It has often been suggested that the blue mold might be killed by a disinfectant in the wash water, as is done with the parastic fungus of the lemon which produces the brown rot. This does not appear from preliminary studies to be promising or advisable. If it were possible to kill the blue mold in the washing tank, it would place a premium on the shiftless

management of the groves and on the rough, careless handling of the fruit. Fumigation, on the other hand, is one of the operations that promotes good orchard management; it maintains strong, healthy trees and fruit, and it reduces the cost of preparing the oranges for market in a manner that increases the keeping quality of the fruit.

[fol. 124] Packing-House Equipment and Conditions

The equipment of the average packing house, especially before 1907, was too complicated to permit of careful handling of the fruit. Some part or parts of the equipment were usually out of order, and there were additional chances for injury from the falling or rapid running of the oranges over gravity chutes or runs. Many of the packing houses have not been equipped on good mechanical principles or with proper regard for the effect of the handling of the fruit on its keeping quality. It is not too much to say that there was practically no consideration given to the effect of packing-house machinery and its installation on the carrying quality of the fruit from about 1895 to 1906, the development being made primarily to handle large quantities at low cost. Since 1906 a good many houses have been modified by the installation of a simpler type of machinery. A better idea of the former condition of many packing houses and of some houses at the present time may be had by referring to a typical example of improper equipment.

A prominent house that had the reputation of shipping fruit of poor keeping quality was running the oranges through about a thousand feet of machinery of different kinds. In order to force the fruit through the machinery as rapidly as possible, a boy shoved the oranges into the washing machine with a paddle, the fruit clogging in the machine frequently and becoming crushed. As many as 1,200 boxes were sometimes run through the washer in ten hours. The capacity of the elevator leading from the washer to the drying racks was overtaxed, and the oranges were dropping back into the washer from heights varying from one to several feet. The fruit was frequently shoved down the drying racks with poles, and in practically every rack the oranges were bumping over the heads of nails or slivers of wood protruding into the runways. It was a common thing to see a boy kick the oranges into place when

the bins became clogged. In this packing house eleven different places were located where the fruit dropped from 1 to 2½ feet or where the oranges were delivered with force at the bottom of a long gravity chute. As a result, crushed and broken oranges could be found at any time along the runways through which the fruit was obliged to pass. It is a tribute to the shipping quality of the California orange that so large a proportion of the fruit of this house arrived in market in sound condition after this harsh type of handling.

Features to be avoided in a packing house.—It is difficult to point out a single place where fruit is likely to be injured in different packing houses, as the arrangement of the machinery varies widely. There are a few features in the [fol. 125] arrangement of every packing house that ought to be considered. A house should be equipped in the simplest possible manner in order to avoid handling the fruit more than is necessary. The dropping of the fruit or its swift delivery from the carrying belts should be avoided. Overhead sizers and all gravity chutes are to be condemned. The slow moving, flat carrying belts should take the place of the gravity chute, as in this way the fruit may be carried wherever desired without injury. The gravity sorting table ought to be replaced by a low belt sorting table.

The hopper is a source of much injury from the rough dumping of the fruit from the picking boxes. A hopper ought not to be higher than the brush to which it leads, and the fruit may be carried to the brush by belts extending into the hopper instead of by a steep gravity run. The present hoppers are too high to make the emptying of the boxes easy. The present hoppers are too high to make the emptying of the boxes easy. The hopper ought to be well padded.

It is a question worth considering whether the hopper can not be eliminated from many houses and the fruit delivered to the sorting belts or on a carrying belt leading to the sorting table. It is entirely practical, if necessary, to deliver the fruit on these belts by taking the oranges out of the boxes by hand.

There is also much injury to the oranges in dropping into and in delivering from the weighing machines and in the drop of the fruit into the packing bins of various kinds, none of which prevents a considerable fall of the fruit when it enters the bin. Another source of injury is the rapid de-

livery of the fruit from a carrying belt to the elevators, scales, bins, or other part of the machinery to which the belts lead. This defect is the result of the use of narrow belts which have to be run at high speed to meet the requirements of the house rather than the use of wider belts of larger carrying capacity.

There has been a great improvement in packing-house equipment in the last two or three years, but the opportunity for the development of simpler types of houses and equipment has not yet been exhausted.

The handling of the packing house force and equipment is also an important factor. Unless the packing house manager is adapted to the handling of labor and can keep the machinery in smooth running order, no amount of improvement in the machinery of the packing house can overcome the bad effect on the fruit of careless, rough, undisciplined labor.

In addition to the need of a simple equipped and well-managed house, the most rigid attention needs to be given to the removal of decaying fruit from the house and its surroundings. It is not uncommon to see rotting oranges in the bins, on the floor, and on the ground around the house. [Fol. 126] Under these conditions, the houses are filled with myriads of blue-mold spores. This lack of attention to the cleanliness of a packing house has a bad effect on the labor, and it is invariably accompanied by rough handling and slovenly work in general. On the other hand, there is not a packing house in California that is leading in the careful handling of its fruit that does not use rigid care to keep the house and its surroundings clean and sanitary.

The Decay of Oranges in Transit

General Description of the Experiments

The investigation of the decay of oranges during transportation included 40 shipments in 1905, 70 shipments in 1906, and 187 shipments in 1907. Nearly all of the fruit was forwarded to New York. The leading object of this investigation was to determine the relation of the following factors to the development of decay in transit: (1) Preparing the orange for shipment in different ways in California; (2) forwarding it at different lengths of time after packing, and (3) shipping the fruit under different systems of transpor-

tation. An investigation has also been made of the changes that occur in the temperature in refrigerator cars when handled under different conditions during the transcontinental trip, and a number of technical engineering problems connected with refrigeration have received consideration. The shipments have included duplicate lots of apparently sound brushed or undressed fruit, of sound washed fruit, of the regular commercially packed fruit, and of oranges showing visible mechanical injuries, such as stem punctures, clipper cuts, and other types of abrasions. The different lots have been packed from the line from which the commercially packed fruit was taken by careful sorting by representatives of the Bureau of Plant Industry. Duplicate lots of fruit have been forwarded as soon as packed and on the second and the fourth days after packing under (1) ventilation, (2) icing, and (3) precooling followed by icing. The decay has been determined by Bureau representatives by the inspection of every orange on the arrival of the fruit in New York.

Through the cooperation of the shippers and receivers, the fruit for these shipments has been turned over to the Bureau of Plant Industry for experimental use and after inspection in New York has been returned to the receiver. The railroad companies have extended every facility for the study of the conditions in transit, and the cold storage interests of southern California made it possible to carry on technical as well as commercial investigations of the precooling process.

[Vol. 127.] The result of the shipments of each of the three years has been consistent with the others. It is impossible to record the details of each shipment during the three years. The shipments of 1907, which were on the most comprehensive scale and are most representative of commercial conditions, will be discussed as representative of the entire work.

The Shipments Under Ventilation.

The shipments under ventilation began in 1907 in February and extended into May. During February and March the weather was cold in California as well as during the trip across the continent. The temperature of the fruit was not often above 50° F. when loaded, and was frequently as cold as the precooled fruit. On the average, the fruit

was probably cooler during the entire trip than the oranges shipped under ordinary icing later in the season. The average decay in the shipments under ventilation, therefore, was comparatively low.

There were two series of shipments under ventilation. The first included apparently sound brushed and washed fruit, commercially packed fruit, and mechanically injured fruit. One-third of each lot went forward as soon as packed and the remainder on the second and the fourth days after packing. This fruit was taken from sections in which the fruit is handled with average commercial care, not representing the roughest type or the most careful type of handling. The fruit was shipped in February. The second series was taken from a single house in which the fruit is handled with care in the groves and in the packing house. It represents the regular commercial pack of the house, the fruit showing on the average not more than 1 to 3 per cent of mechanical injury. The fruit of this house is not brushed. The shipments in the second series began in February and extended into May. The result of the shipments under the first series, shown also in figure 10, is brought out in the following table:

Table III.—Percentage of decay in oranges handled with average care, shipped under ventilation, February, 1907.

Treatment or condition of fruit	Decay following immediate shipment and approximate delay of 2 days and 4 days.			
	(None) Per cent	(2 days) Per cent	(4 days) Per cent	Average Per cent
Brushed fruit, apparently sound	1.4	2.2	2.7	2.1
Washed fruit, apparently sound	1.7	3.7	5.1	3.5
Commercially packed fruit	2.1	4.8	5.3	4.1
Mechanically injured fruit	9.4	15.0	21.7	15.4
Average	3.6	6.4	8.7	...

Two important factors are brought out by these shipments: (1) The oranges that are handled the most simply, i. e., the apparently sound brushed fruit, develop the least [fol. 128] decay, while the fruit that is sorted from the same bins but has been injured in handling develops the greatest amount of decay; (2) the fruit, taken as a whole, that was shipped out promptly after packing developed little decay, while the fruit that was delayed before shipment developed a good deal of decay, the injury from the delay being least

severe in the sound brushed fruit and greatest in the fruit that was mechanically injured. The increase in the decay in the apparently sound brushed and washed fruit as a result of the delay in shipping is probably due to the fact that it was not possible to eliminate all of the injured oranges in sorting the fruit from the bins.

The result of the shipments under the second series, i. e., of fruit handled carefully in the groves and packing houses, is brought out in the following table:

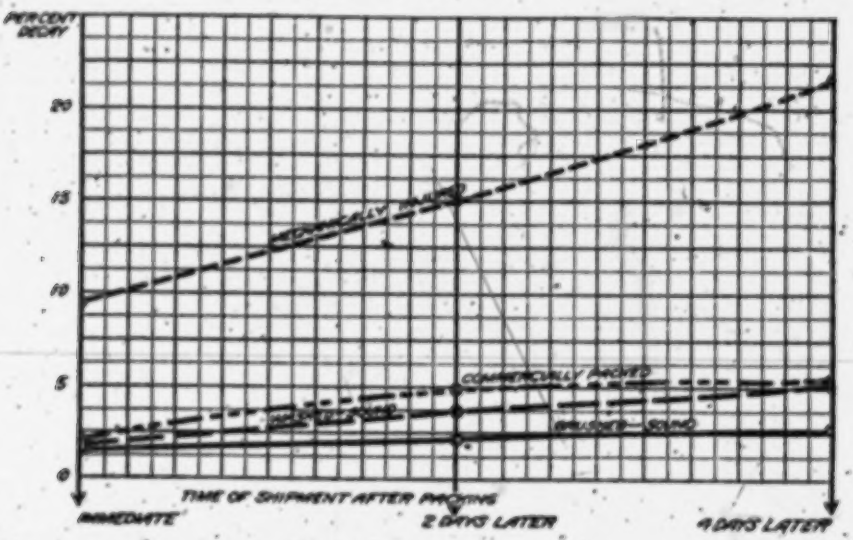


FIG. 10.—Diagram illustrating the percentage of decay in oranges handled with average care, shipped under ventilation, February, 1907.

Table IV.—Percentage of decay in oranges handled carefully under commercial conditions and shipped under ventilation from February to May, 1907.

Date of first shipment	Decay following immedite shipment and approximate delay of 2 days and 4 days.			
	(None) Per cent	(2 days) Per cent	(4 days) Per cent	Average Per cent
February 26	0.7	0.8	1.3	0.9
March 19	1.8	1.7	1.8	1.8
April 1	1.0	1.9	2.3	1.7
April 19	0.8	1.4	2.7	1.6
May 1	2.7	1.7	2.7	2.4
Average	1.4	1.5	1.9	....

[fol. 129] This table shows that oranges can be handled in a large commercial business with enough care to insure the

arrival of the fruit in market in sound condition when shipped under ventilation through a large part of the Washington Navel shipping season. It also shows that there is little practical difference in decay in sound fruit shipped in February or in the succeeding months. As the fruit of this house has shown no better inherent keeping quality than other sound fruit from the same region, a brief description of the methods employed in handling the crop will be useful in showing how a crop is carefully handled in a large commercial business.

Methods used in preventing decay in oranges in a large commercial business.—The fruit shipped under the last series was grown and packed by a corporation owning several hundred acres of groves and packing its own fruit. When the present investigation of the Bureau of Plant Industry was undertaken in 1905, the fruit from this house sometimes arrived in market showing from 5 to 30 per cent of decay. The handling of the fruit was done with the average care used in preparing the fruit for market at that time. An investigation showed that 20 to 25 per cent of the oranges were cut with the clippers or were stem punctured, and that the packing house, which was equipped with overhead sizers, contributed to the further injury of the fruit. In 1906 and in 1907 the fruit was picked with care. The labor in the groves is paid by the day. It is under the management of a competent foreman. As a rule the orange as cut from the tree has a long stem, and a second cut removes the stem close to the fruit. The pickers average from 40 to 50 boxes a day, and the clipper cutting and stem puncturing have been reduced to from 1 to 3 per cent. The loading and the hauling of the boxes to the packing house are done with care. Gravel is kept out of the boxes and they are not filled full enough to bruise the oranges on the top when the boxes are stacked. The packing house is handled by a skillful foreman. The oranges are not brushed. The machinery is of the simplest kind and is run at comparatively low speed. The packing and the loading of the cars are done with care. The packers average from 50 to 60 boxes a day. The fruit has been shipped under ventilation until about two months after most of the shipments from southern California have begun to be forwarded under ice.

From the business standpoint this fruit took high rank in the market as soon as careful handling methods were adopted in 1906, and it has held it ever since. In addition to a good pack, it has commanded the confidence of buyers on account of arriving in sound condition day after day. The excess in net return has been many times greater than the extra cost of careful handling. The extra cost of handling the fruit carefully has probably not amounted to 10 cents a box.

[fol. 130] What has been accomplished here can be dupli-

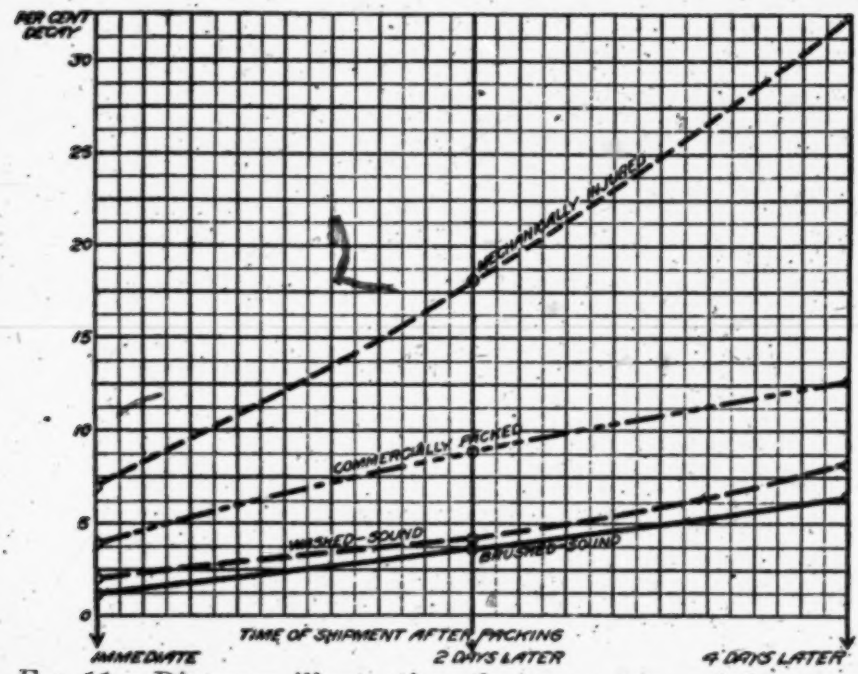


FIG. 11.—Diagram illustrating the percentage of decay in oranges handled rather roughly, shipped under ice, February to April, 1907.

cated, so far as the sound arrival of the fruit is concerned, by any other shipper in California who will preserve the natural keeping quality of the fruit by handling it carefully in the grove and packing house rather than attempting to handle the shipments at the lowest possible cost under conditions that make the fruit susceptible to decay.

The Shipments Under Ice

The shipments under ice in 1907 began in March and extended to the last of May. They were made from different

parts of the citrus belt. There were two series of shipments under ice. The first was from a group of houses in which the fruit was handled in the groves and packing houses rather roughly. It included apparently sound brushed and washed fruit, commercially packed fruit, and mechanically injured fruit. The second series was from a group of houses in which the fruit was handled in the groves and packing houses with more than average care. It included apparently sound brushed fruit, commercially packed fruit, and mechanically injured fruit.

The result of the shipments under the first series, shown also in figure 11, is brought out in Table V:

[folo. 131] Table V.—Percentage of Decay in Oranges Handled Rather Roughly and Shipped under Ice, February to April, 1907

Treatment or condition of fruit	Decay following immediate shipment and approximate delay of 2 days and 4 days.			
	(None) Per cent	(2 days) Per cent	(4 days) Per cent	Average Per cent
Brushed fruit, apparently sound.....	1.2	3.7	6.4	3.8
Washed fruit, apparently sound.....	2.0	4.2	8.1	4.8
Commercially packed fruit.....	3.9	8.9	12.6	8.5
Mechanically injured fruit.....	7.00	18.1	32.4	19.2
Average	3.5	8.7	14.9	....

Two important factors similar to those developed in the shipments under ventilation are brought out by these shipments: (1) The decay is least in the fruit that is handled the least, i. e., the apparently sound brushed fruit, and greatest in the fruit that is mechanically injured; (2) the decay increases as the time between packing and shipping increases. The delay in shipping the fruit causes the least injury to the soundest fruit and develops the greatest injury in the mechanically injured oranges.

The result of the shipments from the houses in which the fruit was handled with care is brought out in the following table:

Table VI.—Percentage of Decay in Oranges Handled Carefully and Shipped under Ice, March to May, 1907

Treatment or condition of fruit	Decay following immediate shipment and approximate delay of 2 days and 4 days.			
	(None) Per cent	(2 days) Per cent	(4 days) Per cent	Average Per cent
Brushed fruit, apparently sound	1.0	1.8	2.6	1.8
Commercially packed fruit	1.0	2.6	4.6	2.7
Mechanically injured fruit	7.9	9.0	14.7	10.5
Average	3.3	4.5	7.3	....

As in the other series under ice, the least decay developed in the sound brushed fruit and the greatest amount occurred in the mechanically injured oranges. The decay is proportional to the length of time that elapses between packing and shipping. The decay in all of the shipments in the second series is less than that in the fruit that was handled more roughly, on account of the sounder condition of the fruit.

A practical illustration of careful handling methods.—There are included in the last series shipments from a grower with extensive groves, whose fruit early in the season of 1907 arrived in New York in bad condition. Some of the carloads developed as much as 25 per cent of decay. Both the shipper and the receiver thought the decay was due to excessive tenderness of the fruit brought on by over- [fol. 132] fertilizing or to other methods followed in handling the groves. An investtigation of this case showed that about 20 per cent of the fruit was mechanically injured in handling. The pickers were paid by the box. It was not considered essential to ship the fruit as soon as it was picked. The packing-house machinery was not well adapted to the careful handling of the fruit, and in the packing house the labor was done with no great care.

The grower decided to change his method of handling the crop. Two or three foremen were tried in the groves before a satisfactory man was found to handle the picking gang; the labor was paid by the day, the picking was done with care, clipper cutting and other injuries were reduced to an average of about 5 per cent, the packing-house equipment was remodeled and simplified, the fruit was not brushed, and it was delivered by hand from the picking boxes to a wide belt that led to the sorting table. The packing-house operations were conducted with more care than

formerly. The result of these changes is one of the most striking that has come under the observation of the representatives of the Bureau of Plant Industry.

The decay in the commercial shipments disappeared as soon as the old methods were changed and did not reappear throughout the season. From the business standpoint the brands from this grower, which up to this time had been handled with caution by the New York buyers, commanded confidence and sold at prices not often surpassed by other brands of fruit. The fruit from this house handled in the experimental shipments developed the following average decay: Apparently sound unbrushed fruit, 1.2 per cent; commercially packed fruit from the same bins, 4.1 per cent; mechanically injured fruit from the same bins, 14 per cent. This grower has recently stated that by insisting rigidly on the careful handling of the oranges the net increased receipts averaged from 50 cents to $1.50 a box after the change in methods was adopted.

An illustration of better handling methods.—There were also included in the shipments under ice oranges from an association that in 1905 had the reputation of producing fruit of the poorest carrying quality, though excellent in other respects. An inquiry in several markets showed that the receivers always expected excessive decay in the brands of this fruit. Many of the growers believed that the decay was due to mysterious local climatic and soil conditions. An investigation of the case in 1906 showed that the growers had depended on the Scutellista cyanea Matsch to hold the black scale in check and little fumigation or spraying had been done in the section for three or four years. The groves were badly infested with scale. Probably 90 per cent of the fruit had to be washed. The packing-house man- [fol. 133] agement exercised little control over the picking of the fruit. On the whole, it was carelessly picked, much of it showing from 25 to 30 per cent of injury. The handling of the fruit in other respects was done with average care. The packing house was of the type shown in Plate III, figure 2. The fruit that was washed passed through more than a thousand feet of machinery of different kinds before it was packed. The fruit often remained in the house a week or more before it was shipped.

As the conditions in this association were typical of many others, both packing-house experiments and shipping ex-

periments were carried on during 1906 and 1907. In 1906 the fruit in the packing-house experiments developed the following amount of decay: Apparently sound unbrushed fruit, 1.9 per cent; apparently sound dry-brushed fruit, 4.2 per cent; apparently sound fruit run through the washers and all other machinery, 10 per cent; mechanically injured fruit, 23 per cent.

The growers were convinced from these experiments that the fruit was not inherently poor in keeping quality. There was a general fumigation of the groves in the section in the autumn of 1906, and not more than 50 per cent of the fruit was washed in 1907. The overhead machinery was eliminated, the equipment considerably simplified and changed, the picking was done with more care in 1907, part of it by a picking crew under the control of the packing house, and the fruit was shipped out more quickly whenever the car shortage did not delay the shipments. In 1907 the average decay in the shipping experiments was as follows: Apparently sound brushed fruit, 1.8 per cent; apparently sound washed fruit, 2.6 per cent; commercially packed fruit, 4.8 per cent; mechanically injured fruit, 26.9 per cent.

This association has not yet reached the limit of practical improvement, but the reputation of its brands of fruit has already been elevated to a higher class, as the fruit has continued to arrive in the markets in better condition than formerly.

The Shipments of Precooled Fruit

The shipments of precooled oranges in 1907 were begun in March and extended into May. They included apparently sound brushed and washed fruit, commercially packed fruit, and mechanically injured fruit, placed in cold storage at different lengths of time after packing and allowed to remain there until the fruit reached a temperature of 35° to 40° F., when it was shipped in refrigerator cars cooled by icing before the oranges were loaded.

[fol. 134] The result of the shipments from a group of houses in which the fruit is handled roughly in the groves and packing houses is shown in the table following and also in figure 12:

Table VII.—Percentage of Decay in Precooled Oranges, March to May, 1907

Treatment or condition of fruit.	Decay following immediate cooling after packing and a delay of 2 days and 4 days.			
	(None)	(2 days)	(4 days)	Average
	Per cent	Per cent	Per cent	Per cent
Brushed fruit, apparently sound	0.1	2.3	3.4	1.9
Washed fruit, apparently sound	0.8	2.3	5.5	2.9
Commercially packed fruit	2.2	6.2	9.1	5.8
Mechanically injured fruit	3.0	9.2	13.9	8.7
Average	1.5	5.0	8.0	

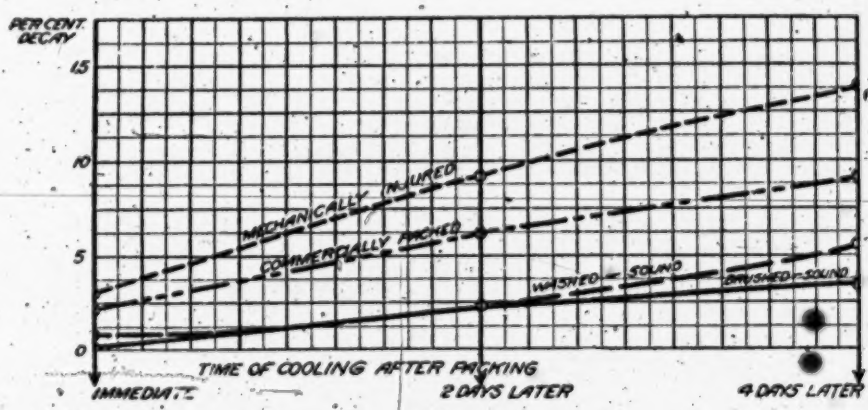


Fig. 12.—Diagram illustrating the percentage of decay in oranges cooled before shipping, March to May, 1907

It will be seen from the table and from figure 12 that the apparently sound brushed fruit decayed least and that there was a progressive increase in the decay through the washed, the commercially packed, and the mechanically injured fruit. This increase in respect to the different types of fruit is similar to that occurring in the shipments under both ventilation and ice. The precooled shipments also bear out the principle of the shipments under ventilation and ice in that the least decay developed in the oranges that were cooled quickly after packing, and considerable decay developed in the fruit in which there was a delay in cooling after it was packed. It appears to be as essential to cool the fruit quickly if it is to be cooled before shipment as it is to ship it promptly after packing, under ventilation or ice. If the decay has an opportunity to develop for

several days after the fruit is packed, it can not be eliminated by cooling the fruit to a lower temperature later on.

[fol. 135] A Comparison of the Decay Found in Connection with the Different Methods of Shipment

By comparing the data under the different methods of shipment it will be seen that the apparently sound brushed fruit arrived under all conditions of shipment with the least decay; that the apparently sound washed fruit, which is more susceptible to decay on account of the washing and additional handling to which it is subjected, decayed more; that the commercially packed fruit, which contains more or less injured fruit, decayed still more, and that the greatest amount of decay developed in the mechanically injured fruit. Sound fruit to start with, therefore, is the foundation for sound fruit in market under all methods of shipment.

It is equally clear that it is essential to ship the fruit promptly after packing or to cool it quickly if it is to be cooled before shipment. A delay of two days in shipping under ventilation or ice or in the cooling of the fruit resulted in an increase in decay, while a delay of four days developed a still greater amount, the increase being least in the apparently sound dry-brushed fruit and greatest in the mechanically injured fruit. It is better to leave the fruit on the trees until it can be shipped than to pick it and leave it in the packing house several days before shipment unless the weather is cold enough to retard the development of decay.

As to the amount of decay under the different methods of shipment, the least decay developed in the precooled fruit, provided the shipments from the houses that handle the fruit roughly, as shown in figures 10, 11, and 12, are compared. On the other hand, there was less decay in the carefully handled commercial shipments under ventilation, discussed on page 44, than in any other series, notwithstanding the fact that the shipments extended through a greater length of time than those that were iced or precooled. This was due to the sounder condition of this fruit as a result of the careful handling methods used in its preparation for market. It will be seen also that the decay in the fruit shipped under ice from the group of houses that

handle oranges carefully, discussed on page 47, is less than the decay in the roughly handled fruit cooled before shipment, discussed on page 46 and shown in figure 11.

The comparative data bring out clearly that if the fruit is uninjured when it leaves California it is likely to arrive in the East in comparatively sound condition, and that under adverse conditions, such as a delay in shipping the fruit, there is less decay in apparently sound fruit than in oranges that have been injured by handling. These data show clearly that it is detrimental to the shipping quality to delay the shipment of the fruit after it is picked and [fol. 136] packed, and, finally, that fruit which is susceptible to decay develops the least trouble when shipped under the precooling method.

The Object of Cooling Fruit Before Shipment

The principal object of cooling fruit before shipment is to quickly retard the ripening processes and the development of decay and to equalize the temperature in the car during the trip. In ordinary iced shipments the fruit is loaded in a car in a warm condition. It requires several days after the fruit is loaded before the temperature of the fruit is reduced to a degree of cold that retards the ripening and the decay. The ripening springs forward with unusual rapidity as soon as a fruit is picked, and as the air of the car is moist from the transpiration of the fruit the conditions are favorable to the rapid development of decay. In a refrigerator car the fruit is cooled by a slow gravity circulation of air from the ice bunkers. The temperature of the air as it leaves the bunkers may fall as low as 34° F. It is warmed by contact with the fruit and grows warmer as it ascends and reenters the ice bunkers of the car. The temperature in the top of the car is several degrees warmer than in the bottom during the first part of the trip, as shown in figure 20, but this difference gradually grows less as the fruit becomes cold.

These are fundamental difficulties in the present methods of handling perishable fruits. They limit the distribution of fruit to the area over which the top tiers of packages can be safely shipped, thereby preventing the development of the most distant domestic and foreign markets. They make it necessary to harvest the summer fruits prema-

turely to provide against the ripening that takes place in transit, thereby placing large quantities of insipid, flavorless peaches, plums, and other fruits before the consumers.

The Refrigeration of Citrus Fruits in Transit

All of the considerations previously mentioned do not apply to the shipment of oranges under the ordinary methods of refrigeration. The ripening processes in citrus fruits proceed so slowly and are of such a nature that it is not necessary to ice the cars to retard the ripening even with ripe fruit in hot weather. The citrus fruits are iced primarily to retard the development of decay and secondarily to retain the fresh appearance of the fruit on arrival in market by preventing undue evaporation from the skin during the trip. A carload of oranges under refrigeration cools down slowly, as each orange is partly insulated in the paper wrapper. The loose ends of the wrappers make a layer of paper between the rows of oranges, and the fruit is packed so firmly that this prevents a free circulation [fol. 137] of cold air around each orange. The cooling is done by conduction of heat from orange to orange and to the air surrounding the packages. In warm weather a car of fruit often covers from one-fourth to one-third of the trip across the continent before the temperature of the oranges drop to 50° F., as shown in figures 18 and 19. The fruit, therefore, may decay during the first part of the trip if it has been handled in such a way as to make it susceptible to decay, especially if it is not shipped promptly after picking and packing. If it is shipped promptly it does not decay excessively except in hot weather, as will be seen by reference to figure 11. The icing of the fruit retards the development of decay temporarily. It transfers the decay from the shipper to the receiver. It does not affect the shipping quality, except the general appearance, or the keeping quality of sound oranges, but it is a means of overcoming for the time being the bad effect of handling the fruit improperly in the groves and packing houses.

The Cooling of Oranges Before Transportation

The cooling of the orange before shipment insures less decay in transit in poorly handled fruit, as the fruit is

started in a cold rather than a warm condition. The fruit arrives in sounder condition, but the oranges that might have decayed in transit under ventilation or ordinary icing decay after the fruit is removed to a warm temperature unless it passes quickly into consumption, as shown in figures 14 and 15. Icing or precooling used primarily to overcome the effect of improper methods of handling in the groves and packing houses should be severely condemned, as it is a means of deceiving the purchaser who buys fruit that is apparently sound only to find the decay developing as soon as the fruit is removed to a warm temperature.

The use of icing or of precooling as a means of overcoming losses that the grower and shipper can not prevent in the ordinary course of business is commendable and is essential in the handling of most of the orange crop in California in warm weather.

The precooling of citrus fruits is worthy of consideration from other points of view. It appears to be possible to save ice in transit by loading the fruit in a cold rather than a hot condition, and it seems to make it possible to increase the freight carrying capacity of a car if the fruit is properly cooled, without increasing the probability of decay. Theoretically the heat withdrawn in reducing a carload of 384 boxes of oranges from 70° to 40° F. is equivalent to the melting of about 2.6 tons of ice. The rest of the ice used in transit is consumed in protecting the fruit against the heat that comes in through the car and in cooling the car [fol. 138] itself. The cars, however, have to be iced before loading when cold fruit is shipped in them, a practice that is not followed under ordinary icing. The saving of ice in precooled fruit when the cars are reiced as often as they are under ordinary icing is slight and does not appear to be of practical importance. The saving comes, however, from the fact that it does not seem necessary to reice precooled fruit during the first part of the trip as often as it is done in ordinary icing. In the shipments in which the temperatures in the cars have been under observation during the transcontinental trip, the temperature of the fruit cooled to 35° and 40° F. has not begun to rise, even in hot weather, until a third or a half of the transcontinental trip has been covered, while in cooler weather the cars have

covered the entire trip to New York without a detrimental rise in temperature, often arriving with at least a ton of ice in the bunkers. Under regular icing the cars are reiced six or eight times during a transcontinental trip. Representative records of precooled cars shipped from California with initial icing only are shown in figures 24 and 25.

It is not intended to draw conclusions from the data at hand as to the effect of precooling as a means of saving ice, but rather to present a limited amount of data to show that this phase of the subject is worthy of careful consideration on the part of shippers and transportation companies.

The second point worthy of consideration is the possible increase in the freight-carrying capacity of a car when loaded with fruit that has been cooled properly for shipment. Under the present method of shipment, the minimum freight weight of a carload of perishable produce is established not by the actual carrying capacity of the car, but by the height to which it is safe to load the car without excessive decay in the top tier or tiers of fruit and by the spacing between the packages that it is necessary to leave for a free circulation of air.

In the experimental shipments of the Bureau of Plant Industry, a number of 40-foot cars have been forwarded with 549 instead of 384 boxes, the latter number being a standard load under ordinary icing. The increase has been accomplished by loading the cars 7 rows of boxes wide, leaving all of the space next to the walls of the car, and 3 tiers high, the upper tier being laid on the side, instead of 6 rows wide, and 2 tiers high, as loaded under ordinary icing. The standard method of loading is shown in figure 3. The method of loading with 549 boxes is shown in figure 13. Under the latter method of loading the fruit may arrive in New York in hot weather with a difference in temperature of 5 to 10 degrees between the top and bottom tiers of fruit, as shown in figure 23, but as the temperature of the fruit is low when it is loaded, it appears to be safe [fol. 139] to ship oranges in this manner in cool weather. In hot weather the cars can be loaded 2 tiers high and 7 rows wide, making 448 boxes. In the first case the capacity of the car is increased 165 boxes, or 11,880 pounds, and in the second case 64 boxes, 4,608 pounds. In a train

of 30 cars the load is increased 356,400 pounds in the first case or 138,240 pounds in the second without adding dead weight to be hauled in the form of extra cars.

This phase of the subject seems worthy of careful consideration on the part of shippers and transportation companies, especially in a time of car shortage.

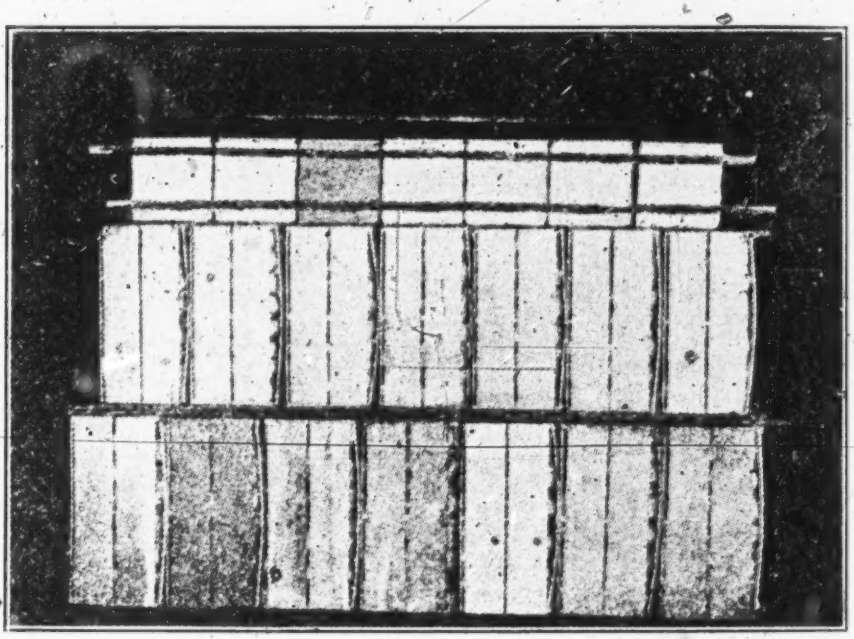


Fig. 13.—Boxes of oranges packed in accordance with the method used in loading a car with 549 boxes

Historical Data on the Precooling of Oranges

The first precooling of oranges was done at the plant of the Los Angeles Ice and Cold Storage Company, Los Angeles, Cal., in the spring of 1905. At that time several carloans of fruit were cooled to 35° to 40° F. in the warehouse for the Bureau of Plant Industry, and, through the cooperation of this company, about 10 loaded cars were cooled by forcing cold air from a coil room in the cold-storage house through ducts which led to the car and back to the coil room. The cold air could be forced in either direction through the cars. A general view of the plans used in 1905 is shown in Plate IX, figure 1.

The same line of work was continued in 1906 by the Bureau of Plant Industry, the fruit being cooled in the cold-storage warehouse.

[fol. 140] A 3-ton ice machine was installed by a commercial company in a packing house at Arlington, Cal., in the spring of 1906, from which cold air was forced through a loaded car and back over a series of ammonia coils, and so on continuously around the circuit. The plant was built on a so-called intermittent vacuum principle, the object being to reduce the atmospheric pressure in the car frequently by a fan, thereby drawing the warm air out of the packages, to be replaced by the cold air when the cold current was again turned on. The capacity of this plant was too small for the purpose of either a practical or experimental demonstration of its value.

In the spring of 1907 the Bureau of Plant Industry had erected, under the direction of Mr. S. J. Dennis, expert in refrigeration, an experimental plant in cooperation with the Los Angeles Ice and Cold Storage Company, for the purpose of making accurate tests of the cooling of oranges in cars by forcing cold air through the cars. This plant

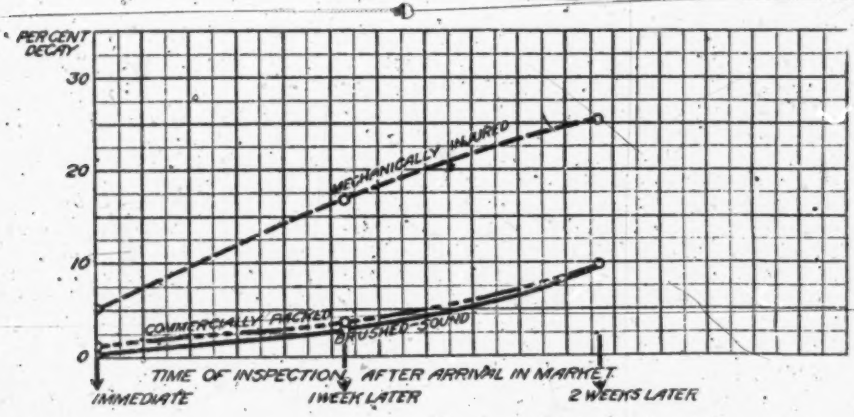


FIG. 14.—Diagram illustrating the percentage of decay upon arrival in market and for two weeks thereafter of precooled oranges handled carefully, 1907.

consisted of two 30-inch square insulated ducts leading from an ammonia coil room capable of supplying from 16 to 20 tons of refrigeration in 24 hours. With a motor and fan the cold air was forced in either direction through the car and back to the coil room. The temperature of the air was varied from 20° F. when first entering the car to higher temperatures. It was forced through the car at different velocities and in volume varying from 4,500

to 6,000 cubic feet a minute. This plant is shown in Plate IX, figure 2. It is hoped to present a report on this plant from the engineering point of view and a discussion of the cold storage of oranges in a future bulletin of the Bureau of Plant Industry on "The Cooling of Fruit for Shipment."

[fol. 141] In addition to the work at the plant at Los Angeles, Cal., extensive shipping experiments were conducted by the Bureau of Plant Industry in 1907 with fruit cooled in cold-storage plants in different parts of the State. A few cars were cooled also at the 3-ton plant at Arlington,

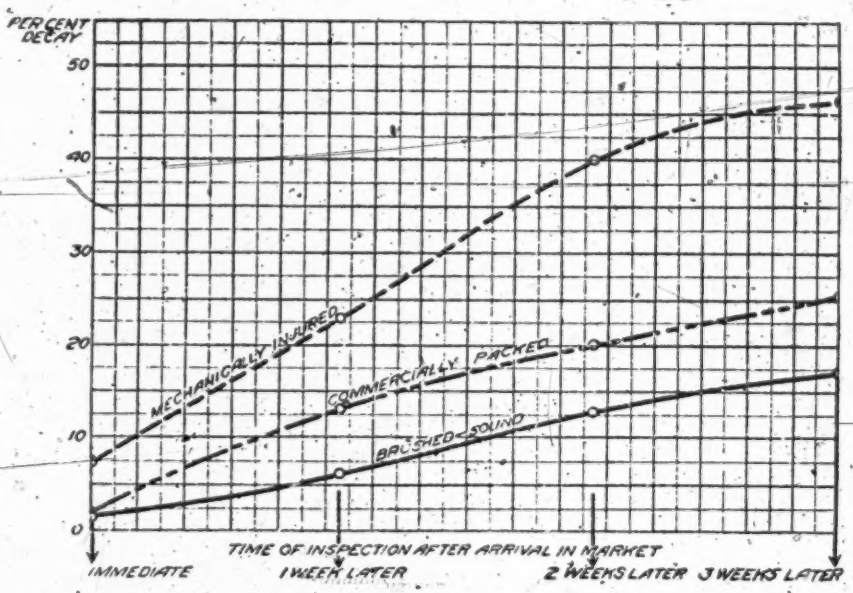


FIG. 15.—Diagram illustrating the percentage of decay upon arrival in market and for three weeks thereafter of oranges handled roughly, shipped under ice, 1907.

Cal., by different parties, and about 300 cars of fruit were cooled commercially in different cold-storage warehouses, the fruit having been stored primarily on account of a shortage in cars.

During the summer of 1907 an experimental precooling plant was erected by interests connected with the Santa Fe Railroad at San Bernardino, Cal., and another plant at Roseville, Cal., by interests connected with the Southern Pacific Company.

The Keeping Qualities of Oranges After Arrival in Market.

During the season of 1907 data have been secured on the keeping quality of oranges after arrival in market, the fruit having been prepared for shipment in different ways in California. The shipments included apparently sound brushed and washed fruit, commercially packed fruit, and mechanically injured fruit. Shipments were forwarded under ventilation, under ice and after precooling, but not under conditions that make a comparison of the three methods feasible.

[fol. 142] On arrival in New York the fruit was held for different lengths of time in a storeroom of a wholesale

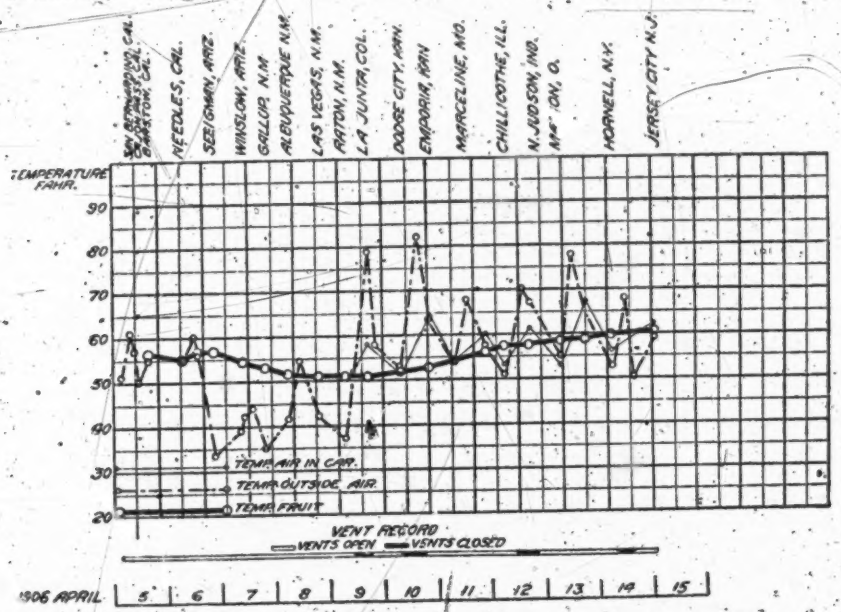


FIG. 16.—Diagram showing the temperature record of a carload of oranges shipped under regulated ventilation, April, 1906.

fruit merchant, and the decay was determined at the end of each succeeding week in storage. Shipments of this type arrived during April, May, and June.

One series of tests included the regular commercial shipments of a large corporation whose fruit is handled in the groves and packing houses with extreme care. The fruit is the same as that represented by the results discussed on page 45. All of it was forwarded under ventilation. The decay developed at different lengths of time after arrival in New York is shown in the following table:

Table VIII.—Percentage of decay in carefully handled oranges, shipped under ventilation, after arrival in New York, 1907.

Character of oranges shipped	Time of inspection. On arrival	After 1 week	After 2 weeks	After 3 weeks
	Per cent	Per cent	Per cent	Per cent
Commercially handled fruit	2.4	5.0	9.1	11.1

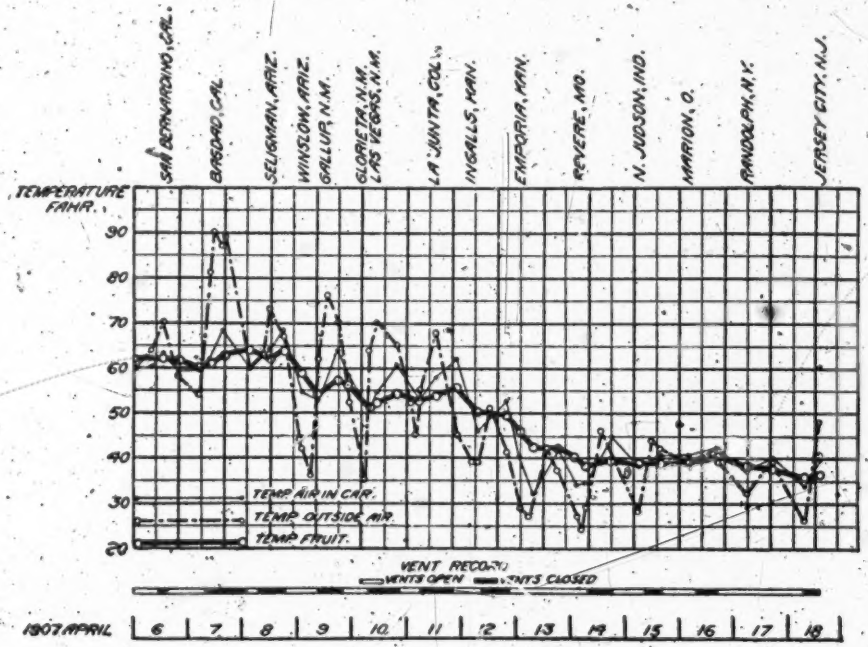


FIG. 17.—Diagram showing the temperature record of a carload of oranges shipped under regulated ventilation, April, 1907.

There was also forwarded from this house in June, after precooling, some carefully selected fruit, commercially packed fruit, and mechanically injured fruit. The decay in the different lots at different lengths of time after [fol. 143] arrival in New York is shown in the following table, and also in figure 14 (p. 56):

Table IX.—Percentage of decay in precooled oranges handled carefully, after arrival in New York, 1907.

Character of oranges shipped	Time of inspection On arrival	After 1 week	After 2 weeks
	Per cent	Per cent	Per cent
Apparently sound fruit	0.4	2.8	9.7
Commercially handled fruit	1.2	3.6	9.7
Mechanically injured fruit	5.2	16.7	25.4

These data are comparable with the decay under ventilation so far as the commercially packed fruit is concerned. There was a little less decay in the precooled than in the ventilated fruit on arrival, and the development after arrival was slightly less. The difference shown is so slight as to be of no practical value except to indicate that precooled fruit that is reasonably sound is not more likely to decay after arrival in market than equally sound venti-

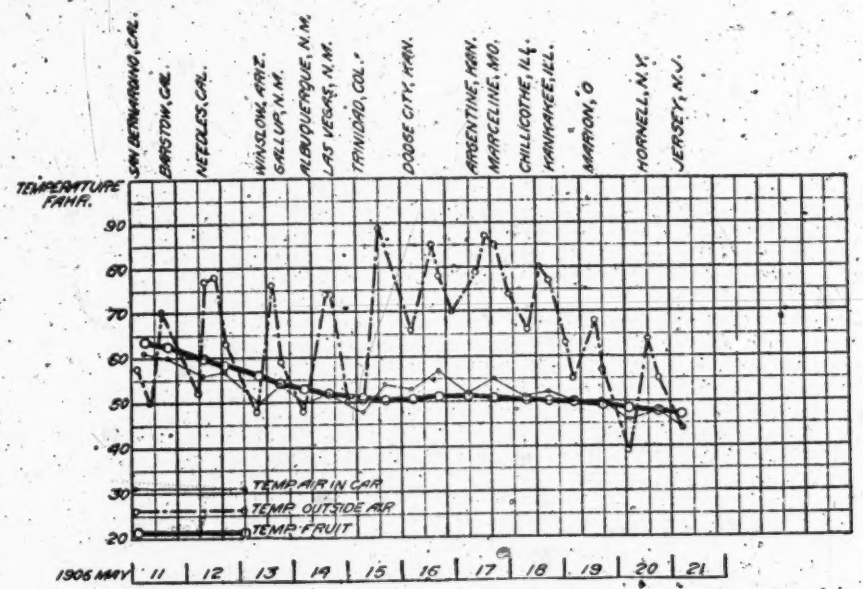


FIG. 18.—Diagram showing the temperature record of a carload of oranges shipped under regular icing, May, 1906.

lated fruit. The increase was slightly less in the apparently sound fruit and greatest in the injured fruit.

[fol. 144] The following table shows the amount of decay in fruit from houses where the oranges handled were picked and packed rather roughly, the fruit arriving during May and June under ice. The data are shown also in figure 15 (p. 57).

Table X.—Percentage of decay in oranges handled roughly, shipped under ice, after arrival in New York, 1907.

Character of oranges shipped	Time of inspection			
	On arrival	After 1 week	After 2 weeks	After 3 weeks
	Per cent	Per cent	Per cent	Per cent
Apparently sound fruit	1.4	6.1	12.7	17.0
Commercially packed fruit	1.9	13.0	20.7	25.3
Mechanically injured fruit	7.4	22.9	39.9	46.1

This table shows the least development of decay in the apparently sound oranges and the greatest development in the mechanically injured fruit. The increase in decay in the commercially packed fruit, which contains more or less injured fruit is greater than the decay in the sound fruit from which the oranges showing visible mechanical injuries have been eliminated.

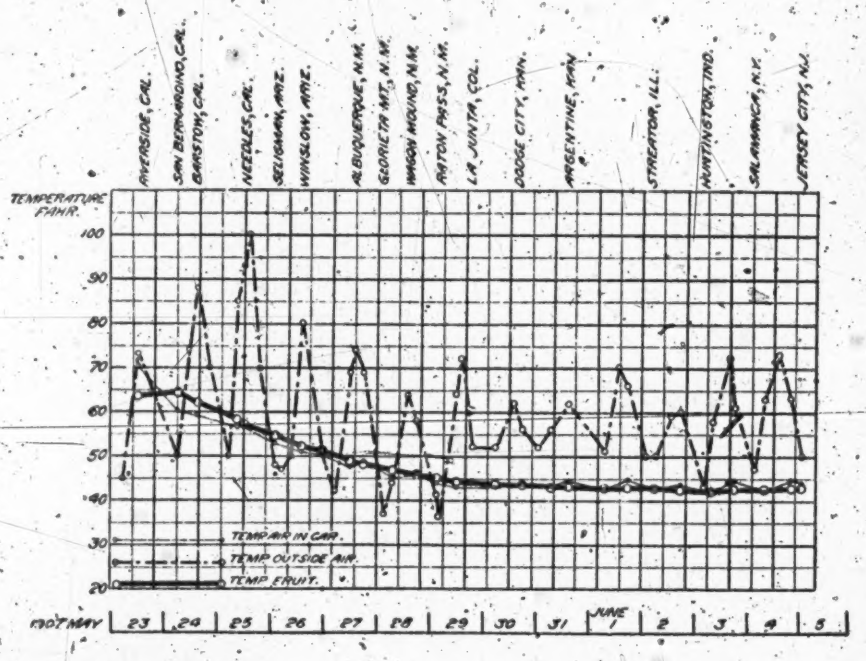


FIG. 19.—Diagram showing the average temperature record of two carloads of oranges shipped under regular icing, May, 1907.

The data on the keeping quality of the fruit in New York, taken as a whole, show clearly that sound fruit to start with is the basis for good keeping quality after arrival in market, as well as the basis for soundness on arrival; that [fol. 145] carefully handled sound fruit keeps as well when shipped under precooling as ventilated fruit, but that unsound fruit having the decay retarded during shipment either by precooling or by icing decays badly when exposed to a warm atmosphere. The general impression that iced fruit decays more quickly than ventilated fruit when exposed to warm air is usually true so far as oranges that are mechanically injured are concerned, as the injured fruit is

more likely to develop decay in transit under ventilation, but it is not well founded when applied to sound fruit.

The Investigation of the Temperature of Oranges While in Transit

During the spring of 1906 and that of 1907 an investigation was made of the changes that occur in the temperature of the fruit, the air in the car, and the outside air during the movement of cars of fruit across the continent under ventilation, icing, and with fruit cooled before shipment and forwarded under several conditions of icing. The records were taken by Mr. G. W. Hosford and Mr. H. M. White, who made several transcontinental trips with train loads of oranges, reading the thermometers several times a day by entering the cars at the icing stations and other stopping points.

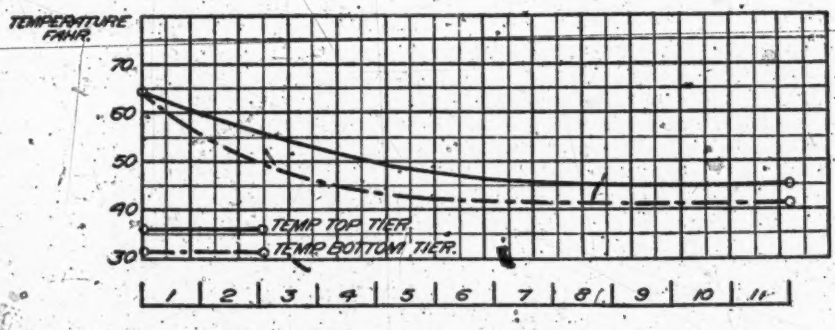


FIG. 20.—Diagram showing the temperature change of the oranges in the top and bottom tiers of boxes in a car shipped under regular icing.

[fol. 146] This investigation was made possible through the cooperation of the railroads in allowing the icing in transit, the reading of the thermometers, and other matters connected with the investigation to be done by, or under the direction of, the representatives of the Bureau of Plant Industry. The records appearing in this discussion were made in cars forwarded over the Santa Fe route.

From three to six thermometers were placed in each car, one to determine the temperature of the air just above the boxes of fruit, the others to determine the temperature of th fruit itself. These latter were inserted in oranges in

the packed boxes. With the exception of a few cases noted, the fruit temperatures were taken in the upper half of boxes in the upper tier midway between the door and the end of the car, one thermometer being placed in an orange next to the outside of the box, and another in an orange in the inside or center of the box. For this purpose special long mercurial thermometers were used which could be read without being removed from the orange. The fruit temperature shown in the following diagrams is the average of the inside and outside fruit temperatures. In some cars a thermometer was placed in the lower half of a box in the lower tier in front of the door. All of the records were made in standard 40-foot refrigerator cars loaded with 384 boxes, except as noted. The diagrams that follow cover two representative records under each method of shipment.

Temperature Records in Ventilated Cars

The accompanying chart, figure 16, shows the temperature record of a car shipped in April, 1906. The record of the temperature of the air of the car was not begun until the train reached the vicinity of Raton, N. Mex. This car was forwarded under regulated ventilation; that is, the ventilators, or ice plugs, in each end of the car were [fol. 147] supposed to be closed whenever the outside air was warmer than the fruit and were opened when the outside air was colder. The regulation in this respect differs from the standard ventilation in practice, which usually provides, so far as the temperature is concerned, that the ventilators shall be closed whenever the outside temperature falls blow 32° F., but does not provide against the rise in temperature in the car when the outside air is above the temperature of the fruit. The regulation of the ventilators in this car was not entirely accurate, as shown in the vent record at the bottom of the chart. The fruit temperature is an average of the temperature in the inside of a box in the top tier at the end of the car and the temperature in the fruit in a similar position in the center of the car.

It will be seen that the temperature of the air of the car lags behind the temperature of the outside air, while the lag in the fruit temperature is much greater than that of the air of the car. The fruit temperature changes slowly even when extreme differences occur outside.

The chart shown as figure 17, page 59, presents the temperature record of a car of oranges shipped under regulated ventilation in April, 1907, with somewhat different weather conditions from those occurring on the former trip. [fol. 148] The results of the experiments with this car demonstrate the fact that the temperature of the fruit changes much more slowly than the temperature of the outside air. It is worth noting that several times during the trip the temperature of the outside air fell below 32° F.

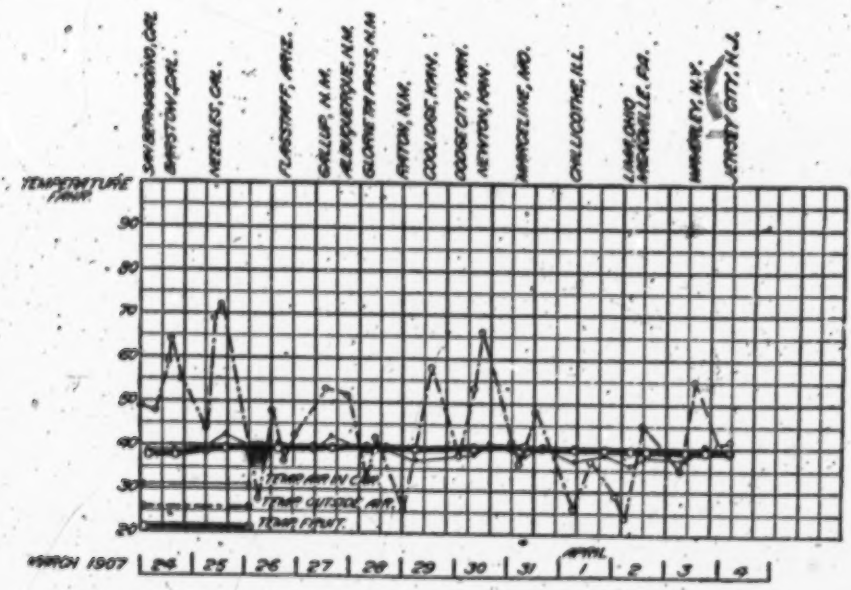


FIG. 21.—Diagram showing the temperature record of a standard carload of 384 boxes of oranges, precooled and shipped under regular icing, March and April, 1907.

and at one time dropped to 24° F. Notwithstanding the fact that the vents were open at the time, the temperature of the fruit, while falling steadily, did not reach a point where there was danger of freezing. Two days of this comparatively low temperature, April 13 and 14, 1907, only reduced the fruit from 50° to 38° F.

The substance of these records shows that the temperature of a carload of oranges under ventilation changes slowly in comparison with the temperature of the outside air; that the temperature outside may often fall to the

freezing point or below without injury to the fruit, provided the fruit temperature is somewhat above that point at the time; that the danger of freezing depends on the persistence of and the degree of the low temperature without or the nearness of the fruit to it when the car enters a freezing temperature; and that the temperature of the fruit in transit would be more uniform if protection

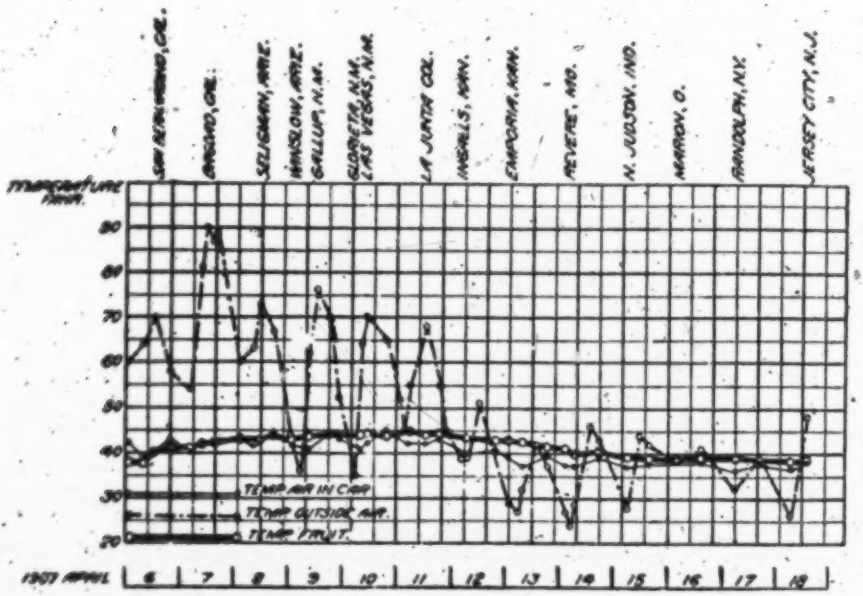


FIG. 22.—Diagram showing the temperature record of a carload consisting of 549 boxes of oranges, precooled and shipped under regular icing, April, 1907.

was made against warm temperatures as well as against cold in the handling of the ventilators. This suggests the need of an organized messenger service for the regulation of ventilated fruit cars, the ventilation to protect the fruit against both excessive cold and heat.

[fol. 149] Temperature Records in Iced Cars

The chart shown as figure 18, page 144, shows the record of a carload of oranges shipped under ice in May, 1906. The The fruit started at 63° F., which is comparatively cool, and the outside air was also comparatively cool until the train reached western Kansas, after which it averaged considerably higher, except at the end of the trip. The tem-

perature of the fruit was 63° F. in starting and reached 50° F. on the fifth day, but did not fall much lower, while the outside temperature remained high.

The record shown in figure 19 (p. 145) represents the average temperature of two cars shipped in the same train under ice in May, 1907. Each car showed practically the same temperature throughout the trip. The temperature of the fruit is the average of five different temperatures in each car. Two of them were taken in the usual place, halfway between the door and end of the car, two were taken in the top tier in the middle of the car and represent the average temperature of the inside and outside fruit, and

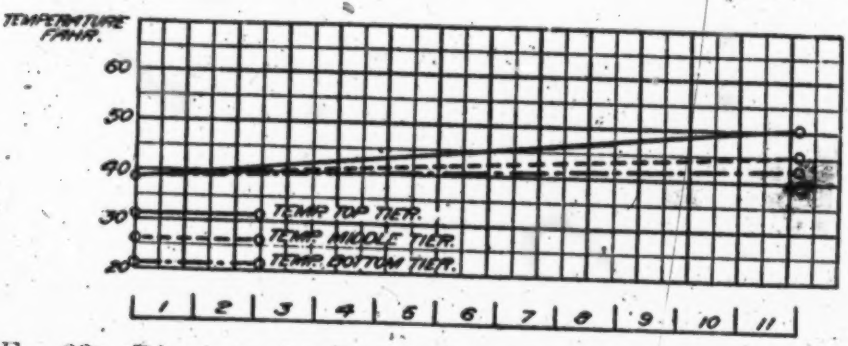


FIG. 23.—Diagram showing the temperature changes in the fruit in the bottom, middle, and top tiers in a carload of 549 boxes of oranges, precooled and shipped under initial icing only.

the fifth in the center of the box in the lower-half of the lower tier in front of the door. The fruit started at 64° F., reached 50° F. on the fourth day, and arrived in Jersey City at 43° F.

The chart shown as figure 20, page 146, shows the average cooling of the oranges in the top and bottom tiers of boxes in the cars shipped under ice in 1907. The temperature was taken in the upper half of the boxes in the top tier and the lower half of the boxes in the bottom tier. The bottom tier cooled faser than the top for several days, the maximum difference reaching 7 to 8 degrees on the third and fourth days of the trip. Gradually the extreme difference between the tiers disappeared, the temperatures of the two tiers from the seventh day remaining about 4 degrees apart.

[fol. 150] The records shows, in substance, that under icing the fruit is not reduced to a low temperature until a

considerable part of the transcontinental trip has been covered, and that the fall in temperature in the top tier lags behind the bottom tier throughout the trip. These records indicate the reason why the fruit sometimes decays excessively when shipped under ice and why the top tiers of fruit, especially in cars of deciduous fruit, reach the market in an overripe and decaying condition. Many oranges leave California at a temperature of 80° F. or higher. The decay starts during the early part of the trip under the icing method, before the fruit is cooled.

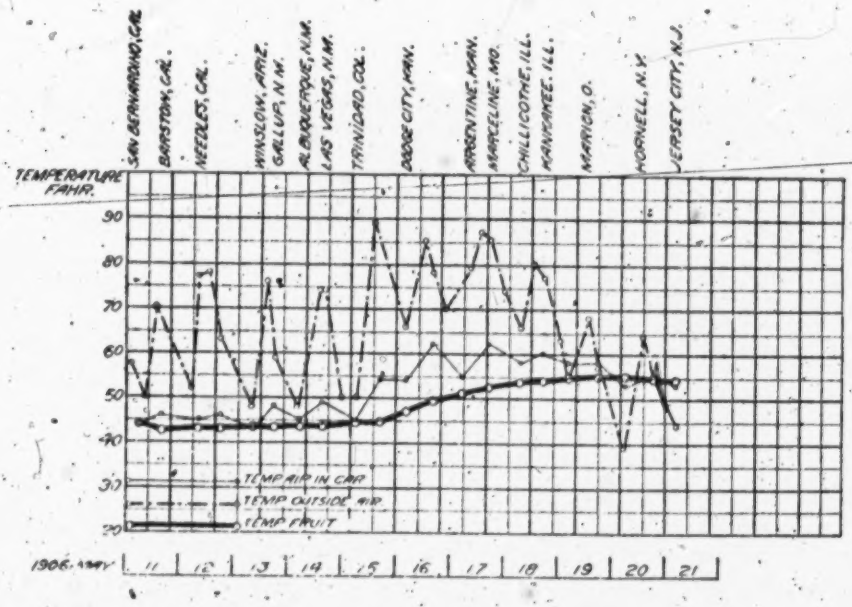


Fig. 24.—Diagram showing the temperature record of a carload of oranges, precooled and shipped under initial icing only, May, 1906.

Temperature Records of Fruit Cooled Before Loading and Iced Regularly in Transit

The chart shown as figure 21 (p. 147) is a record of the temperature of a carload of oranges of 384 boxes placed in cold storage before loading and which left California in March, 1907, at a temperature of 38° F. The car was iced before the fruit was loaded and was reiced in transit at the regular icing stations. The temperature of the fruit remained practically constant throughout the trip, the air of the car changing slightly with the outside air.

The accompanying chart, figure 22 (p. 148), is a record of the temperature of a carload of 549 boxes of oranges placed in cold storage before loading and which left California in April, 1907, at a temperature of 38° F. The car was iced [fol. 151] before the fruit was loaded and was reiced regularly in transit. All of the thermometers in this car were placed near the door. The fruit temperature is an average of the fruit next to the outside of a box in the third or top tier and the fruit in the center of the lower half of a box in the bottom tier. The temperature of the fruit rose to 45° F. during the first half of the trip and probably would have risen higher if the outside temperature had not been colder during the latter half of the trip.

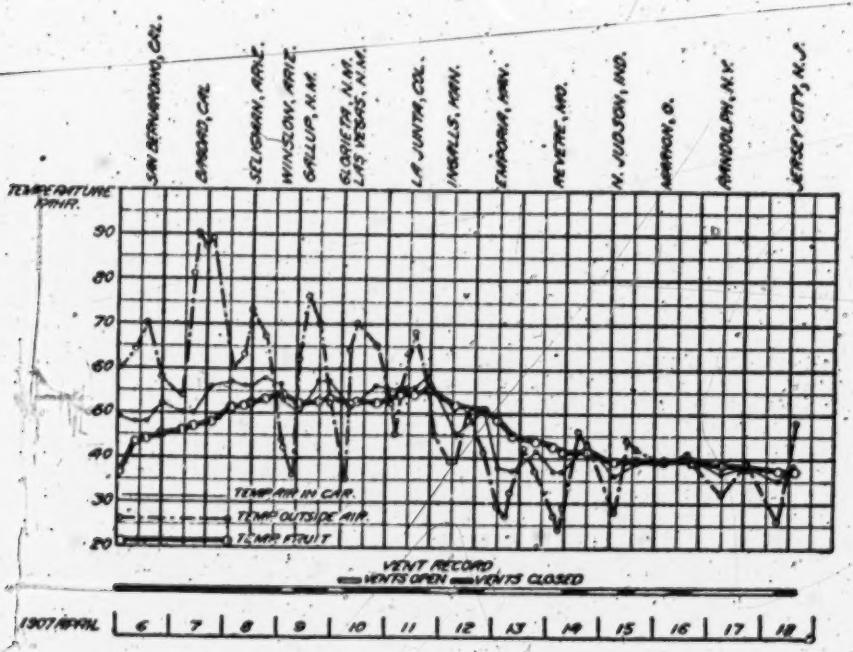


Fig. 25.—Diagram showing the temperature record of a carload of oranges, precooled and shipped under initial icing only, May and June, 1907.

The accompanying chart, figure 23 (p. 149), illustrates the average temperature of the fruit in the different tiers of a 3-tier car loaded with 549 boxes. The fruit was loaded into the car at a temperature of 38° F. Upon arrival is Jersey City it was found that the temperature on the top tier was 51°, the middle tier 48°, and the bottom tier 43° F. This is the largest difference that has been found in any of the

3-tier precooled cars under observation. The record is the result of reading the temperature of the fruit at the beginning and end of the trip and is not a continuous record from day to day.

Temperature Records of Fruit Cooled Before Loading and Iced in California Only

The chart shown as figure 24 is a record of a carload of oranges placed in cold storage before loading and which left California in May, 1906, at a temperature of 42° F. The car was iced before loading and was reiced at San Ber-

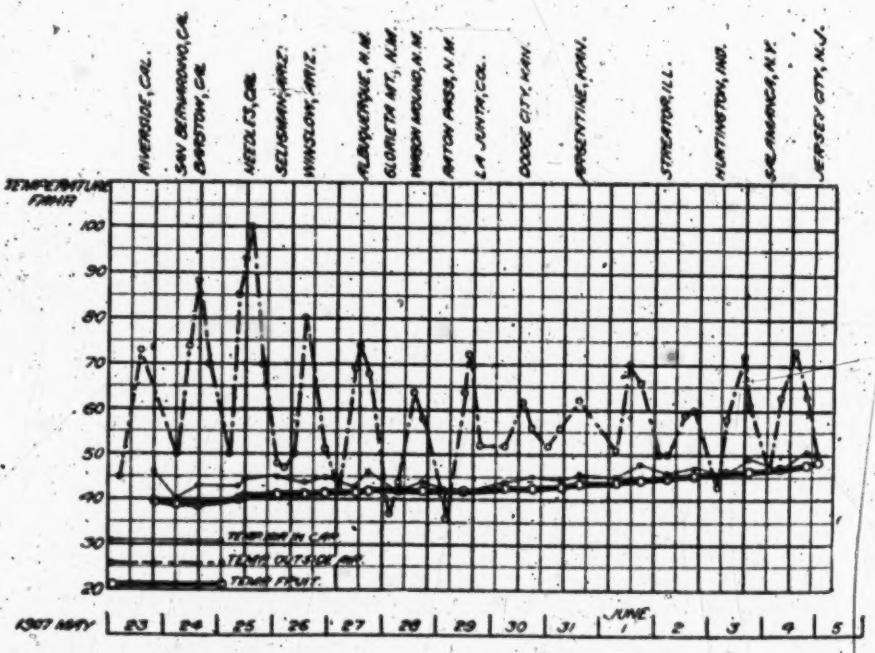


FIG. 26.—Diagram showing the temperature record of a carload of oranges, precooled and shipped without icing under regulated ventilation, April, 1907.

[fol. 152] nardino before leaving California. It was not reiced during the rest of the trip. It arrived in Jersey City with about 700 pounds of ice in the two bunkers. During the first half of the trip the weather was reasonably warm, but the temperature of the fruit remained fairly constant. During the latter half, through Kansas and as far as Illi-

nois, the outside temperature was higher. The temperature of the car then began to rise, the temperature of the fruit rising also from 45° to 55° F., but lagging considerably behind, with a tendency to recede during the cooler weather at the end of the trip. In this connection the record of the car under ice shown in figure 18, made in the same train, should be noted. In this car the fruit started at a temperature of 63° and did not drop below 50° F. during the warm weather. In the fruit precooled and iced in California only it started at 42° and rose during the latter half of the trip as high as 55° F. The condition of temperature in the precooled car is preferable so far as the decay of the fruit is concerned.

The chart shown as figure 25 is a record of a carload of oranges of 416 boxes placed in cold storage before loading and which left California in May, 1907, at a temperature of 39° F. This car was iced before loading and was reiced at San Bernardino before leaving California, but not during the rest of the trip. The car was loaded 7 rows of boxes wide on the bottom tier and 6 rows wide on the top tier. [fol. 153] It arrived in Jersey City with 3,000 pounds of ice in the two bunkers. The temperature of the fruit rose gradually from 39° to 48° F. In this connection the record of the iced car shown in figure 19, which was in the same train, should be noted. The lower temperature during the latter half of the trip reduced the temperature of the fruit to a lower degree than the fruit in the iced car shown in figure 18, and at the same time it prevented as great a rise in the cold fruit as occurred in the car shown in figure 24. It also saved the ice as compared with the car shown in figure 24.

The chart shown as figure 26 shows the record of a carload of oranges placed in cold storage which left California in April, 1907, at a temperature of 37° F. The car was not iced either before or after loading. It was forwarded with the ice plugs inserted. The temperature outside was warm and the temperature of the fruit rose rapidly. After the train reached Winslow, Ariz., the temperature of the air at night began to fall below the temperature of the fruit, and from that point on the car was run under regulated ventilation. The record indicates that it is not safe, so far as the temperature of the fruit is concerned, to load precooled fruit in warm weather in a hot car and to forward it without ice.

Summary of Precooling Records

The substance of the records under precooling demonstrates that the temperature remains fairly constant in fruit that has been cooled and is forwarded in a car iced before loading and iced regularly in transit; that the temperature of fruit cooled to about 40° F., forwarded in a car iced before loading, and reiced at San Bernardino, Cal., only, remains fairly constant for at least half of the transcontinental trip, when the temperature may begin to rise if the weather is warm; that it may be safe to ship oranges cooled to about 40° F. to points in the western half of the United States with California icing only, provided the time in transit is normal; that the fruit may be shipped across the continent in reasonably cool weather when handled under the preceding conditions; that the need of reicing in transit would probably have to be governed by the quantity of ice remaining in the bunkers at any point and not by a predetermined fixed rule, and that it is not safe to load cold fruit in a warm car and forward it without icing.

Summary

The citrus-fruit crop of California amounts to nearly 30,000 cars annually, of which the orange comprises from 85 to 90 per cent. The fruit is grown under intensive culture, and the handling, shipping, and marketing of the crop have resulted in the development of complex and highly specialized business practices.

[fol. 154] The losses from decay in the orange during transportation formerly amounted to $750,000 to $1,500,000 annually. The decay is caused by a blue-mold fungus which enters the orange through mechanical abrasions in the skin. The most common forms of mechanical injury are those caused by the clippers in cutting the fruit from the tree, stem punctures, and scratches and bruises produced in the packing houses. Most of these injuries are invisible to the inexperienced eye. There has been a wide variation in the amount of injury in the fruit of different pickers, growers, and packing houses, the variation commonly running from 1 to 50 per cent. A good deal of the trouble has been related to methods of business which place a premium on the amount rather than the quality of the work done by the picker, the grower, or the packing house.

By holding in many packing houses in California fruit that has been picked at different periods of the season in different sections of the citrus belt, and that has been handled in different ways, it has been shown that the fruit that is handled the least develops the least decay, while the fruit that shows the greatest amount of injury develops the most decay. From the standpoint of the packing house, the least decay develops in sound unbrushed fruit. Brushing increases it, washing increases it still more, and any treatment that cuts or tears the skin is followed by the greatest amount of decay.

There appears to be little difference in the amount of decay in oranges grown in different sections that have been handled in a similar manner, or in oranges picked from the same grove with equal care at different periods of the season, at least from January to May.

The "curing" of the orange for a few days before packing wilts the skin and in the early part of the season makes it pliable to handle. The curing is probably not harmful to uninjured fruit, but under the conditions of commercial handling in California the blue mold begins to develop in the injured oranges during the curing period, but does not develop far enough to be seen by the graders except in fruit that has been injured severely.

If the fruit is packed promptly after picking and is shipped at once in a cool temperature the decay may not develop in transit. The most progressive shippers now pack the fruit promptly after picking.

It is unnecessary to brush as large a proportion of the oranges as has been customary in the past, and the washing can be avoided by treating the groves properly for scale. The packing houses all through the citrus belt are being modified in the direction of more simple machinery.

The shipping experiments of the Bureau of Plant Industry during the last three years have included 297 shipments [fol. 155] of fruit to New York. The shipments have included oranges handled in different ways before packing. The fruit has been shipped at different lengths of time after packing, and it has been forwarded under ventilation, icing, and precooling followed by different conditions of icing.

From the standpoint of the handling of the fruit the least decay has developed under all methods of shipment in the sound, carefully handled oranges, and the greatest amount

has developed in those that were mechanically injured. From the standpoint of the promptness of shipment after packing the least decay has developed in the oranges shipped immediately after packing, and the decay has increased in proportion as the time between packing and shipment has lengthened. From the standpoint of the method of shipment the least decay developed in the precooled fruit that was loaded in the cars in cold condition.

The cooling of the fruit to a temperature of about 40° F. before shipment appears to save ice in transit, as the cars do not require reicing as often as they do when forwarded under regular icing. It appears also to increase the freight-carrying capacity of a car by making it possible to load the boxes more closely than is safe under regular icing. From the standpoint of decay, precooling the fruit is not essential, as the decay can be avoided by handling the fruit carefully. Precooling retards decay temporarily, but does not remove the cause. It should supplement rather than take the place of careful handling.

In the market holding tests the fruit that has not been mechanically injured keeps the longest, while the greatest loss occurs in oranges that have been thus injured.

The temperature of the fruit changes slowly in transit. In ventilated cars there may be extreme changes in the outside air, and if the extremes do not persist long the changes in the temperature of the fruit are relatively slow. In iced cars the temperature falls relatively fast during the first few days, but a train may cover one-third of the trip across the continent before the temperature of the fruit reaches 50° F. The decay develops rapidly during the early part of the trip, while the fruit is warm. In a car in which the fruit is cooled to 40° F. or lower before shipment the temperature remains nearly constant if the car is reiced regularly in transit. In cool weather it remains fairly constant without additional icing after the car leaves California. In warm weather the reicing during the first half of the trip can be avoided, but the car may need reicing during the latter half of the trip.

[fol. 156] Description of Plates

Plate I. Frontispiece. Washington Navel oranges, showing blue-mold decay. The upper figure shows the stem cut

short, with an injury in the fruit made by the clippers. The decay started at this injury. The lower figure shows an orange with a long stem and a puncture made by such a stem. The decay is developing around the injury. (Fruit considerably reduced in size.)

Plate II. Washington Navel orange trees. Fig. 1.—One of the Washington Navel orange trees sent to California by the Department of Agriculture in 1873. Fig. 2.—A Washington Navel orange tree three years after planting.

Plate III. California orange groves and a packing house. Fig. 1.—A typical view of bearing orange groves. The foreground shows contour planting to facilitate irrigation. Fig. 2.—Interior view of an orange packing house in southern California, with an old-style overhead sizing machine and gravity chutes leading to the bins. This type of house contains too much complicated machinery to insure careful handling of the fruit.

Plate IV. Orange brushing machines. Fig. 1.—A common type of brushing machine with a hopper. Fig. 2.—A belt-carrying device placed over the brush to deliver the fruit from the hopper to the elevator. This device can be removed when it is desired to brush the fruit.

Plate V. Machinery in use in an orange packing house in southern California. Fig. 1.—An automatic weighing machine in operation. Fig. 2.—One type of sizing machine in operation. The narrow carrying belts on either side are used to return to the graders poor fruit found in the bins.

Plate VI. An interior view of a desirable type of orange packing house. This is a type of house without overhead or complicated machinery. The grading belt in the background is shown in detail in text figure 2. The drop from the grading belt to the sizers is necessary to allow room for the weighing machines. (From a photograph furnished by the manager of the packing house.)

Plate VII. The washing of citrus fruits. Fig. 1.—A lemon washing machine in operation. The fruit is emptied into the tank of water at the right of the picture. It is then cleaned between revolving brushes in the circular tank and delivered on the canvas table at the left, where it is graded according to color. Similar machines are used in washing oranges. Fig. 2.—Washed oranges on drying racks.

Plate VIII. Valencia oranges. The upper specimen was taken from a grove that had been thoroughly fumigated for

the black scale. The lower specimen is from a grove that had not been fumigated for the black scale. The sooty-mold fungus on the upper part of the fruit grows in the honeydew exuded by the scale. Such fruit has to be washed. (Fruit considerably reduced in size.)

Plate IX. The cooling of oranges in cars before shipment. Fig. 1.—The experimental plant used in 1905. Fig. 2.—The experimental plant erected and used in 1907.

(Here follow pages 157, 158, 159, 160, 161, 162, 163 and 164.)

[fol. 165] Index.

	Page
Auction, eastern markets, percentage of oranges sold	96-97
Bahia orange, introduction into California, etc.	93
name	10-94
Black scale, injury to orange	122
Blooming, relation to decay of fruit	119
Blue mold fungus, cause of decay in oranges	154
of citrus fruits, description and investigations	105-107
Brushes, orange, types	121
Brushing of oranges, cause of decay	121-122
decay of fruit in packing houses	115-117
necessity, degree	154
value questionable	121-122
California, citrus fruit crop	153-155
industry, general description	93-104
Fruit Growers' Exchange, cooperative, organization, methods	97
northern, early orange crop, causes	95
Riverside, navel orange industry, beginning, importance, etc.	93-94
southern, decay of oranges of different sections	117-118
regions favorable for citrus fruit growing	95
Car, capacity, increase by precooling fruit	138
refrigerator, for shipping oranges, require-	

FIG. 1.—A TREE SENT TO CALIFORNIA BY THE DEPARTMENT OF AGRICULTURE IN 1873.

FIG. 2.—A TREE THREE YEARS AFTER PLANTING.

WASHINGTON NAVEL ORANGE TREES.

FIG. 1.—A TYPICAL VIEW OF BEARING ORANGE GROVES.

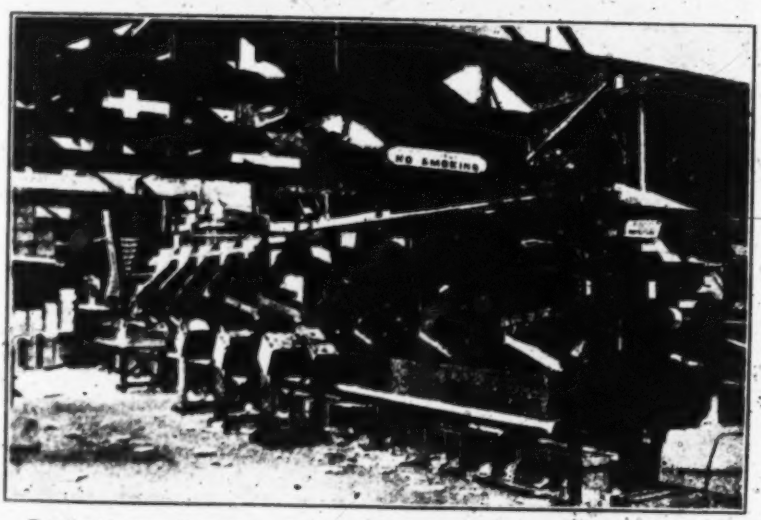


FIG. 2.—INTERIOR VIEW OF AN ORANGE PACKING HOUSE WITH AN OVERHEAD SIZING MACHINE.

CALIFORNIA ORANGE GROVES AND A PACKING HOUSE.

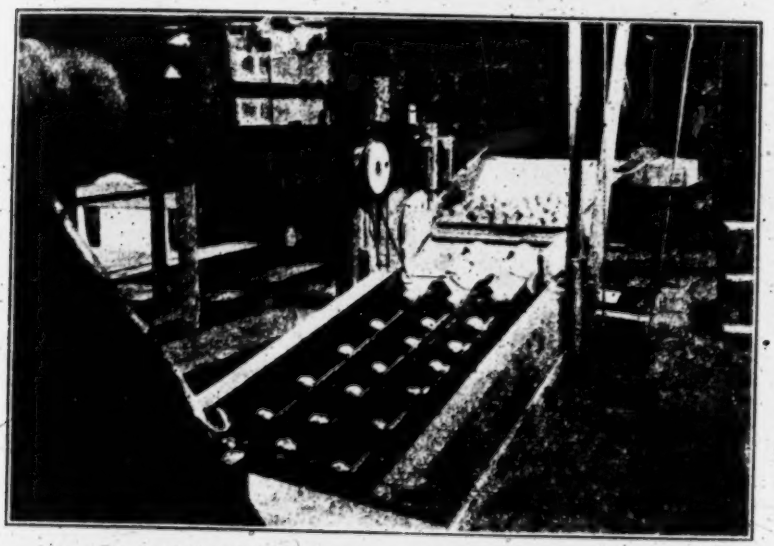


FIG. 1.—A COMMON TYPE OF BRUSHING MACHINE, WITH A HOPPER.

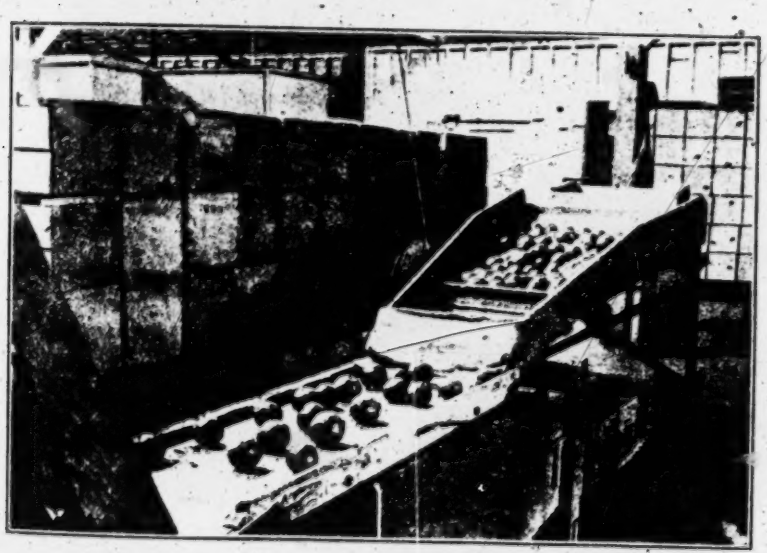


FIG. 2.—A BELT-CARRYING DEVICE OVER A BRUSHING MACHINE.

ORANGE BRUSHING MACHINES.

FIG. 1.—AN AUTOMATIC WEIGHING MACHINE.

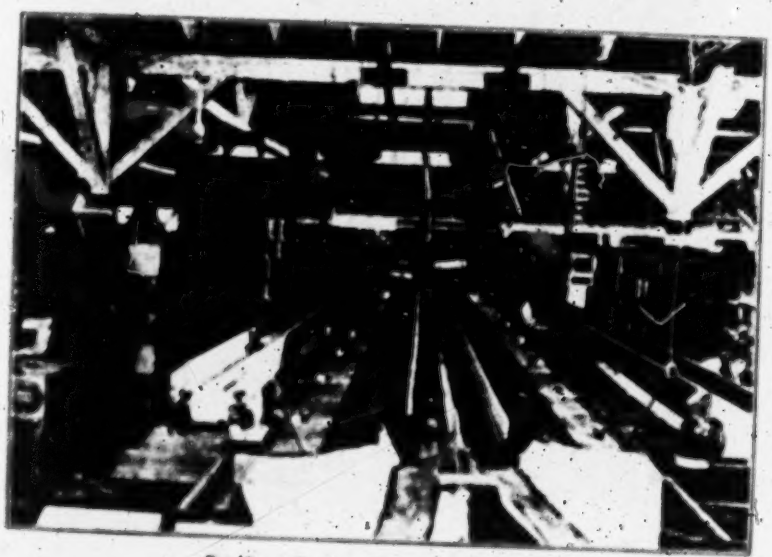
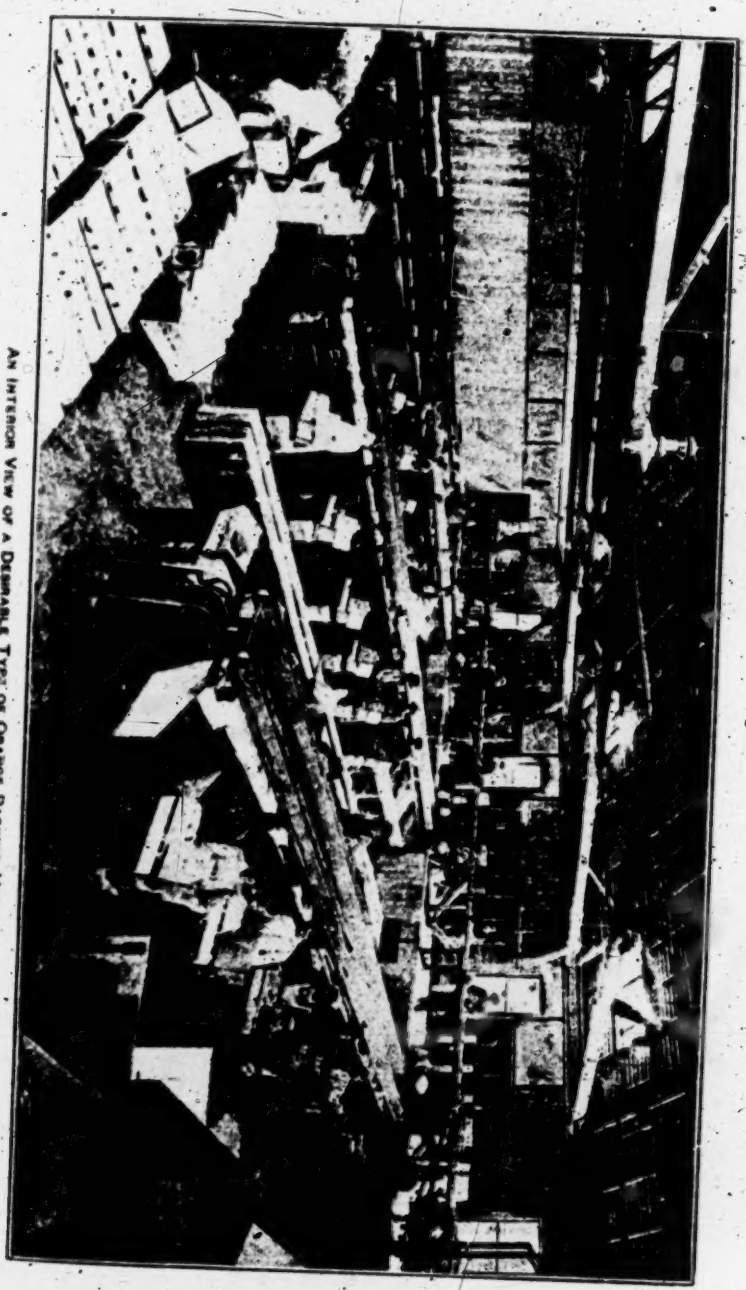


FIG. 2.—A TYPE OF SIZING MACHINE.

ORANGE PACKING-HOUSE MACHINERY.



AN INTERIOR VIEW OF A DESIRABLE TYPE OF ORANGE PACKING HOUSE.

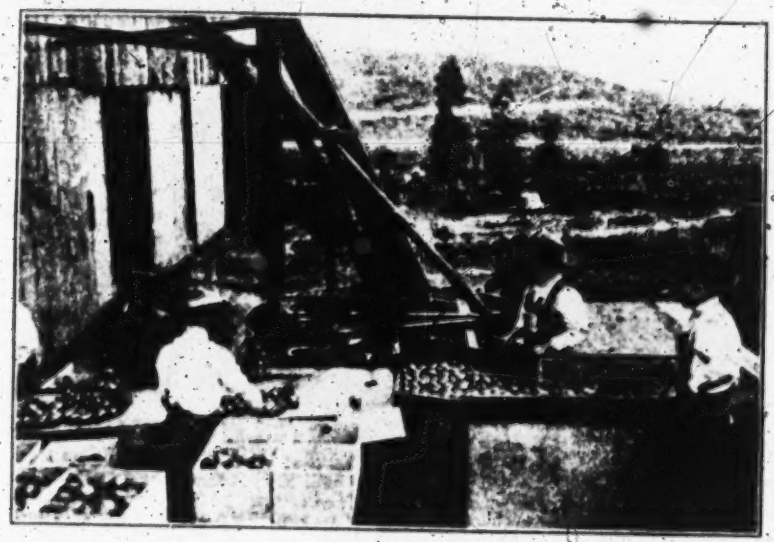


FIG. 1.—A LEMON WASHING MACHINE IN OPERATION.

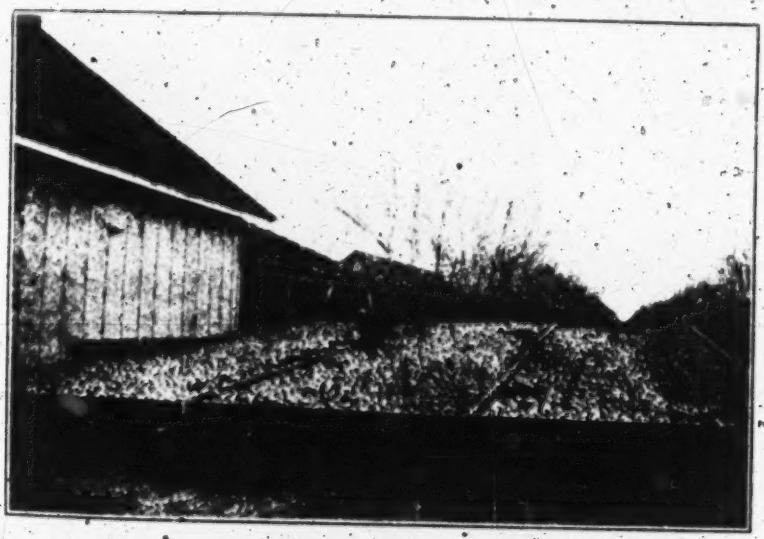
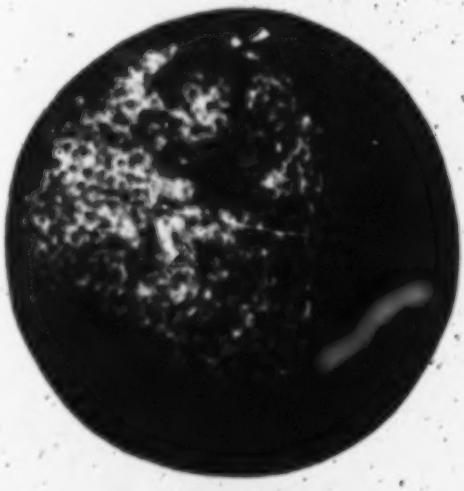


FIG. 2.—WASHED ORANGES ON DRYING RACKS.

THE WASHING OF CITRUS FRUITS.



E. J. Schutt

VALENCIA ORANGES.

Lower specimen affected with sooty mold fungus.

(Specimens considerably reduced in size)

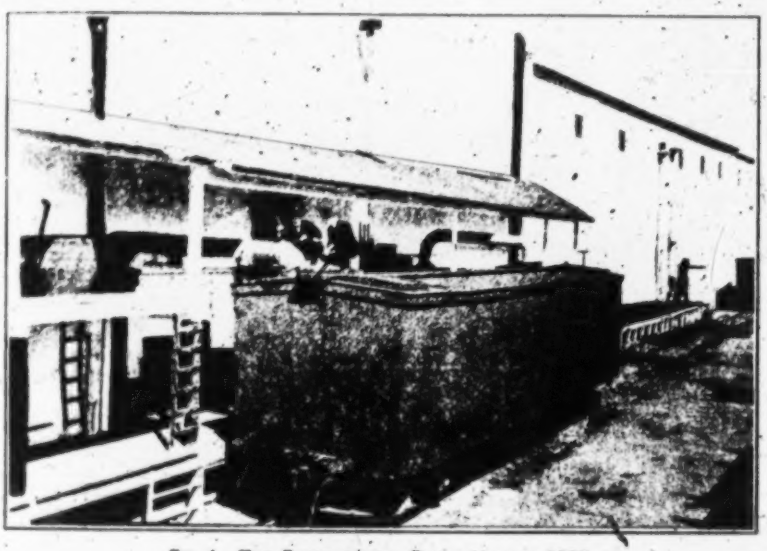


FIG. 1.—THE EXPERIMENTAL PLANT USED IN 1905.

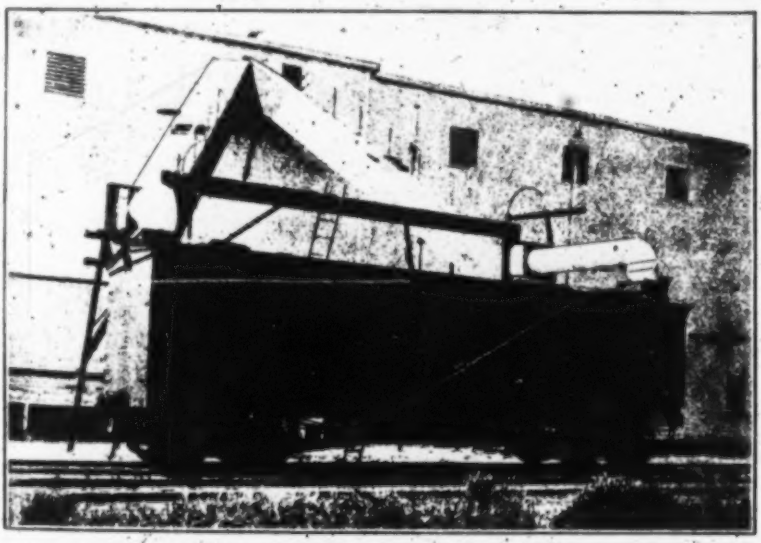


FIG. 2.—THE EXPERIMENTAL PLANT USED IN 1907.

THE COOLING OF ORANGES IN CARS BEFORE SHIPMENT.

Page

ments 102–103
standard, for shipping oranges, capacity, weight, etc. 103
Cars, loading methods 103–104
Citrus-fruit belt, cultural conditions 95–96
crop, California, annual, size, importance, etc. 153-155
methods of handling and marketing ... 96–99
groves, size 96
industry, California, development ... 95
extent 94–95
general description 93–104
Clippers, cuts by, cause of decay 107–114
for picking citrus fruits, types 99
Cold storage. See Storage, cold.
Cooling of fruit before shipment. See precooling.
plant, experimental, Bureau of Plant Industry description 140
Cooperation, associations, methods 97
Crops, cover, for citrus orchards 95
Culls grade of oranges, definition 102
Curing before packing, benefits questionable 120–121
oranges, development of blue mold 154
Decay in oranges in different periods of the season 118–120
sections 116–118
transit 126–136
experiments, general description 126–134
stored in packing houses, experiments 114–116
[fol. 166] Decay of citrus fruits, investigation of causes ... 104–114
methods of prevention 129–130
Discount on cars for off sizes 102
Eastern markets, percentage of citrus fruits sold at auction 96–97
Epidermis, orange, abrasion, cause of decay 106
Fungi, cause of decay in oranges, description, etc. 105–106, 154
effect of cold on growth on orange 106–107

Page

Freight rates, carload of oranges, to New York and Chicago 104
cars of oranges 103–104
Fumigation of orange groves, prevention of mold 123
result of neglect 132
Grading of citrus fruits, grades defined 101–102
Grape-fruit in California 94
Groves, fumigation, necessity for prevention of sooty mold 123
size 96
Growers, orange, cooperation in handling and marketing crops 96–98
interest in careful picking 109–110
work in marketing crop 98
Handling oranges, commendable methods 131–133
injury an economic problem 111–112
weakness of present method 113
Harvest, citrus fruits, methods 98
time; lemon, crop 96
orange crop, various regions 96
History of development of practice of precooling oranges 139–141
Honeydew, infestation of oranges 122
Hopper, packing house, suggestions 125
Ice, shipments of oranges, experiments 130–133
Icing of cars, saving of ice by precooling fruit 138
refrigerator cars 104
Introduction to bulletin 93
Irrigation, citrus-fruit belt 95
growing, intensive system, period 95
Keeping quality of oranges after arrival in market 141–145, 155
Labor, marketing citrus fruit, methods 98
Lemon crop, time of harvest 96
industry, California, extent 94
Machinery, packing house 100–101
Marketing citrus-fruit crops, methods 96–99
cooperation as factor in careless handling 113
oranges, injuries in handling, cause of decay 107

Page

keeping quality after arrival at destination 141–145
percentage of injury in handling 108
reduction of cost of handling 112–113
Markets, eastern, percentage of citrus fruit sold at auction 96–97
outside of California, percentage shipped 94
Methods, commendable, of handling oranges 131–133
weakness in present system 113
Mold, blue, citrus fruits, description and investigations 105–107
fungus causing decay 154
Navel orange, description, characteristics, etc. 94
introduction into California, etc. 93–94
Oil-sprays for black scale, note 122
[fol. 167] Orange cars, capacity, etc. 102
crop, handling, reduction in cost not always justifiable 112–113
weakness in present method 113
northern California, conditions favorable to early crop 95
time of harvest, various regions 96
industry, California, extent 94
navel, California crop, 1906-07, value 94
regions, California 95
trees, introduced navel, transplanted at Riverside, Cal. 94
Oranges, careless handling 124
curing before packing 120–121
decay, causes 104–114
experiments with different methods of handling 114–126
in transit 126–136
differences in decay for several sections 116–118
handling, experiments with different methods 114–126
injuries in handling, cause of decay 107
mechanical 107–114

Page

keeping quality after arrival in market 141–145
loss from decay in transportation, annual, causes, etc. 154
losses in marketing in California 93
methods of insuring uniformity 113–114
percentage of injury in handling 108
stored in packing houses, decay, experiments 114–116
temperature while in transit, investigation 145–153
varieties grown in California, value 94
Orchards, citrus-fruit, cover crop 95
Packer, orange, day's work 101
Packers, interest in careful picking 109–110
Packing citrus fruits 100–102
benefits from prior curing questionable 120
care in placing and pressing 120
house equipment and conditions 124–126
features to be avoided 124–126
methods to be avoided 124
suggestions for improvement in handling fruit 124–126
houses, capacity and equipment 100
location 100
oranges, careless handling 124
for shipment, temperature 103
suggestions 124–126
various steps 100–101
when damp, cause of decay 123
Pea, Canada, cover crop in citrus-fruit belt 95
Penicillium digitatum, blue mold of orange 105–107
glaucum, blue mold of orange 105–107
Pickers, injury to fruit, percentage by each of ten in same grove 109–110
Picking citrus fruits, careless, cause of injuries and decay 154
ignorance of growers and packers as to importance of care 109–110

Page
investigations as to injuries 107–117
methods 98–99
payment by the box as factor in losses 112
crews, desirability 98
[fol. 168] Plates, description 158
Pomelos in California, production 94
Pooling system, cause of careless handling 113
Precooling of citrus fruits, advantages 155
data 139–141
object 136–139
promptness necessary 134
shipments under ice, percentage of decay 133–134
summary of records 153
Refrigeration of citrus fruits, object of cooling before shipment 136–141
in transit, methods 136–141
See also Precooling.
Refrigerator cars, icing, etc. 104
service, methods of shipping 102–104
Regions, citrus fruit, California 95
Saissetia Oleae. See Scale, black
Scale, black, injury to orange 122
Scutellista cyanea, enemy of black scale 122
Shears, citrus-fruit picking, types 99
Shipment, delay, cause of increase in decay 128
different methods, comparison of decay in fruit 135–136
methods 102–104
oranges, decay in transit, experiments 126–136
time in transit from southern California to Chicago 104
New York 104
precooled fruit in cars iced in California only 147–152
with initial icing only, temperature records 149–152

Page

under ice, experiments, results 130–133
percentage of decay in carefully handled fruit 131
roughly handled fruit 130–131
ventilation, carload temperature record 142
experiments, results 127–130
percentage of decay 127–128
after arrival at market 142–145
precooled fruit, temperature records 152–153
Shipping experiments, general description 126–136
of Bureau of Plant Industry 141
promptness necessary 128
value in delaying development of blue mold 154
season, periods 98
time, citrus fruits 102
Soil, management, citrus-fruit belt 95
Sooty mold, quantity, etc. 122
Standard car of oranges, definition 102
grades of orange, definition 101–102
Stems, punctures by, cause of decay 107–114
Storage, cold, temperature records of carload of oranges placed in cold storage before shipment 150–151
Storage, cold, temperature records of carload of citrus fruit cooled before loading and iced in California only 151–153
decay of oranges, prevention by varying treatments 114–115, 118
Stored oranges, packing houses, average decay, experiments 115–119
Summary of bulletin 153–155
[fol. 169] Temperature changes in citrus fruit in car compared with outside air 148
Temperature changes in citrus fruit in transit, investigations 145–153, 155
citrus fruit in transit, difference in top and bottom of car 149

Page

packing oranges for shipment 103
records of citrus fruit in transit shipped under ice 144–151
records of citrus fruit in transit, shipped under ventilation 142–143, 146–148
records of precooled citrus fruit in cars iced in California only 151–153
records of precooled citrus fruit in iced cars 150–151
records of precooled citrus fruit in cars under ventilation 152–153
[fol. 170] Thermometers, positions in cars of fruit shipped under ice 146
Tibbets, Mrs. L. C., work in introducing navel orange in California 103
Transportation and refrigeration of citrus fruits 136–137
of citrus fruits, decay in transit, experiments 126–136
Unbrushed oranges, decay in packing houses 115
Ventilation, importance in shipping citrus fruit 102–103
results of shipping experiments 127–130
Vetch, winter cover crop in citrus-fruit belt 95
Washing oranges cause of decay 122–123
decay of fruit in packing houses 114–119
Washington Navel orange, introduction into California 93
Winter shipments, danger of freezing 103

[fol. 171] PLAINTIFFS' EXHIBIT No. 9

Proceedings of the Twenty-first Annual Meeting of the Florida State Horticultural Society, Held at Gainesville May 12, 13, 14 and 15, 1908.

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Methods of Shipping and Packing

By W. S. Hart

MR. PRESIDENT, LADIES AND GENTLEMEN: It has been wittily said, "To train a child, commence with his grand-

father." So to market fruit easily and profitably, one should commence by so cultivating, fertilizing and handling the grove as to produce good fruit, i. e., fruit of desirable sizes, good color, fine appearance, heavy weight, leathery rind and with juice qualities of the highest type; but, as all this has been and will continue to be discussed in these meetings by other committees, I will pass on to the time the fruit is taken from the tree.

By a careful study of Prof. G. Harold Powell's very valuable report, "The Decay of Oranges While in Transit From California" (Bureau of Plant Industry, Bulletin No. 123), and the report of Prof. Tenny before this society last year, all orange growers should become convinced of the important part that *careful* and *proper* handling of the fruit bears on the matter of successful marketing. With the best product of its kind, put on the market in the best [fol. 172] possible shape there remains little in the way of "marketing problem" that need tax the ability of any able business man.

Every handler of fruit wants the output of him who furnishes the best. To the dealer it means high prices, the most profit, the best trade and the finest kind of advertising at no cost whatever; for every grower wants to get in where high prices are being steadily realized, no matter what the quality of his own fruit may be, and the consumer able to pay for the best goes to the high-priced merchant, feeling assured that there is where he will find it.

I propose in this paper to give special attention to that branch of the subject coverin gthe preparation of oranges so that they may command the attention of the best trade o narrival in market, leaving the broader but not more important phases of marketing to other members of this committee, whose experiences especially fit them for the work.

Hire all help by the hour, except, possibly, the foreman and box-maker. When sending the pickers to the grove they should be well equipped with plenty of the best tools for their work that the market, or the employer, can provide.

A strong draft animal, nith nose covered so that he cannot browse even a leaf from the trees, a good, three-reach platform wagon so made that the hind wheels will follow the tracks of the front ones, plenty of good field boxes made

to rest one on top of the other in a way that will not allow of slipping, and with sides lower by three inches than the tops of the end heads, wit hopenings at the sides near the bottom to allow of the free circulation of air and easy cleaning, with sides not too thick or heavy, and the box to hold no more or less than from one-half to a full packed box of oranges according to the system of handling, and provided with good hand holds at the ends. Never use bags for picking. Either baskets, tin or galvanized iron [fol. 173] receptacles are the only ones on the market that are safe. The latest make of basket leaves little to be desired in that line.

Send a light but strongly made stepladder for every picker and a good extension ladder to about every three men, if the trees are of good size. Most important of all, send clippers that are strong and durable so that each picker can afford to own and care for the one he uses, and so made as to render it as near to an impossibility to clipper-cut or puncture an orange as possible and yet allow of cutting the stem snug to the calyx, or even slice a part of it from the fruit.

Until within a very short time, there has been no really good orange clipper on the market. Now the need is fully met. It is best always to send an extra pair of clippers along, and also a jug of water, that time may not be wasted in trips back to the packing house in case either is needed. No man should be allowed to use a pair of clippers that is not in perfect order so as to do good work rapidly.

With the foregoing equipment and a piece of chalk for putting their number on each box they pick, the pickers should start their work at the bottom branches and work up as high as they can easily reach; then take the step ladders and, without leaning them against the tree, clean it of its fruit to fourteen or fifteen feet from the ground. Above this, long ladders will have to be used; but the utmost care should be exercised not to jam the limbs and fruit out of place more than can be avoided; as where that is done much fruit is injured by thorning, crushing, scratching, or being shaken from the tree. Do not allow pickers to pull on an orange to get it within reach of the clippers. Every orange should be so clipped that if the stem end should be firmly pressed against another orange, it could not injure it.

The picker should be trained to clip three or four oranges, where hanging handily, before putting them in the basket; which must be done carefully and without a drop of over a half-dozen inches at most. Don't leave scattering fruit, but pick clean as far as you go, unless selecting [fol. 174] for size or ripeness. Turn the fruit into the field boxes with care, keep all dead twigs and trash out of all receptacles and keep the fruit shaded from the hot sun while waiting to be hauled. In loading, see that no box is so full as to permit of injuring the fruit by placing another on top of it, or that any may roll off.

If oranges drop so that injury is possible, lay them out as culls. There are many methods of handling fruit at the packing-house. They should be studied and the one best suited to the individual needs adopted; but there are some general directions that may apply to all cases. The packing-house should be arranged for the careful and economical handling of fruit, as little carrying from place to place as possible; as little lifting of heavy weights as need be and above and over all, plenty of light. The house, bins and runways should be kept reasonably clean and no rotting fruit be allowed to remain in them or in out-of-the-way corners to fill the air with blue mold germs. Everything that fruit comes in contact with—receptacles, runways, spouts or finger nails—should be often inspected to see that no rotten fruit, slivers, nail heads, rough trash or sharp edges can, by any possibility, come in contact with it. If oranges could squeal like a pig when hurt, there would be noisy times in some packing-houses and about some pickers.

The markets have had washed fruit and like it, if washed without injury. No washer will do good and safe work in the hands of careless workers; but there are some now on the market that, properly handled, will rather add to than injure the keeping qualities of our fruit while doing nice work. I wash all my fruit, though it is as clean and bright as that of any grove probably, and I could hardly be hired to give up the practice. After washing the fruit should be dried, being but one layer deep before being put into bins or crowded together in any way. A wet skin does not hurt sound citrus fruits if all parts are wet. Drying on one side and soaking on another is not recommended. My own

[fol. 175] packing-house is so arranged that if fruit has to be taken in wet from the outside drying rack, it will dry evenly in the trays where it is graded.

All citrus fruits should be carefully graded into at least two grades. My own practice is to make three grades: Fancy, No. 1 Bright and No. 2 Bright. I have few russets. While grading, I have the scale insects, where there are any, removed by scraping with a light spatula of hard pine. Any orange that is even doubtful as to soundness is put in the cull box.

I prefer to pack after the fruit has been off the trees at least twenty to thirty hours and has lost its rigidity.

If the system of handling is in deep masses of fruit, then the quicker they are packed and shipped the better their condition on arrival in market. If the nights are cool and the days warm, it is advisable to close the packing-house tightly before the air warms up much, as otherwise it will deposit its moisture on the cold fruit so that they become dripping wet and unfit to be handled for the time being. With this exception a good current of pure air through the packing house is always desirable.

From the grading trays, the fruit goes to the large hopper holding many boxes, and from there to the sizer and through the spouts to the packing-bins. The slope of the hopper should be a little greater, but for drying rack and spouting, three-fourths inch to the foot is about right. There are many sizers on the market and several do good work. I should choose one that by no possibility could injure the fruit, that would size by the largest diameter, would be lasting, simple in construction and easy to run.

The bins from which the fruit is packed should be of good size; those likely to receive the greatest quantity should be the largest; those taking the largest and smallest sizes can be of less capacity. They should be so constructed as to avoid the necessity of pulling the fruit about with the hands and should have either canvas bottoms or be well cushioned where the oranges are to drop more than four inches.

[fol. 176] Use strong but not heavy tissue paper for wraps. The so-called Japanese is good, but a little too transparent. Paper that will give a reddish tinge to the fruit is best, if not too tender. Have your private brand

printed on each wrap, and not so large but that the whole of it will show plainly on a 200-size orange. Wrap with brand opposite the stem and pack as closely as possibly without injury to the fruit. If the pack runs too high or two low, don't pass the box until it is made just right by changing some of the fruit. The sizer must be set according to the shape of the fruit and will occasionally require re-adjusting where the average shape changes, as it will do when running on different varieties or fruit from different soils.

Close packs will not stand to pack as high as the looser ones. From half to three-quarters of an inch above the heads of the box, necessitating considerable pressure in putting on the cover, is about right if packed properly in the layers. If the boxes are trimmed with lace paper it is best to paste it at the bottom of the box and pack the first two or three layers with the brand next to it, then stencil so that in opening, that side will be the cover. If an attractive display card for the retailer to hang in his store is put in, it helps the marketing. Everything that tends to give the impression of care and neatness about a packed box and its contents adds to the price the fruit will bring and increases the demand. I have my material gotten out to orders sent in May for fall delivery. Bead the edges of every side, use a handsome strap thick enough to allow air to circulate between the boxes, and a neat and tasty stencil or printer. Don't hesitate to put time and labor into preparing your fruit for market, for there is where a good portion of the profit lies. Every large city contains one, two or three, seldom more, fruit dealers who handle only fancy stock and they have customers who care little for the price they pay but are only satisfied with the very best fruits obtainable. These are the houses that purchase from the man who puts intelligent work into his products; [fol. 177] they are the ones that pay a dollar, two dollars or even more above the top quotations and never find more than they want of the kind that pleases them. There are only about three houses of this kind in New York, our largest city. The others pay the prices quoted, but they will pay more for the second grade or for the poorer sizes of the man who supplies the best trade than they will for the best fruit of the careless shipper.

The shipper who caters to the best trade is not apt to be the one who ships, one, two or more cars a day, but he may employ as many hands as one who does and give them work four months each season, help his town as much and net as much profit as his neighbor who has several times his acreage and crop. The man who makes and markets his crop at a cost of $1.25 and gets $1.50 for it makes a clear profit of 25 cents. He who sells for $3.00 makes five times as much net gain, if we allow 25 cents for added commission and cost of preparation, and there will be a short time almost every season when he will gross six or seven dollars per box for his best grades and sizes. At these prices, the small grower of only a few thousand boxes, and groves not so large but that he can handle them properly and protect them in case of danger, may have quite a satisfactory income, while he escapes much of the anxiety and loss of the large grove owner who cannot give the close personal supervision necessary to the very best work. I am a believer in small groves, but there are individuals who are built for big things and can carry them on successfully, though they seldom reach the top of the market.

The matter of agencies through which to market is one that I will leave mostly to other members of this committee to present; but I wish to say this much: if you put your fruit in the hands of commission houses, look them up carefully before doing so, both as to reliability and courage in naming prices. To put hundreds, or thousands, of dollars' worth of your products into the hands of strangers at a distance, with no security or guarantee of a square [fol. 178] deal, is one of the strangest customs of our business system. You would not loan money to them without careful consideration and ample security. Why should we throw such fearful temptation in the way of our fellow man and give him so many chances for fraudulent gain with little chance of punishment until, whether honest or not, he gets blamed when results fall short of our expectations? If we must do this, let us at least take every means possible of eliminating temptation and assure ourselves of the integrity of those who sell our products. Some salesmen have little trouble in asking 25 cents above the market for something extra nice; but for the shipper of the choicest oranges there must be salesmen who know a good thing

when they see it and who can ask fifty cents, a dollar or two dollars above market with absolute assurance that it is not an overcharge.

Much condemnation has been heaped on the heads of those who make early shipments of green fruit. It is often claimed that such shippers get meagre returns and ruin the orange market for others for the season; that it should be frowned upon by every citrus grower or handler and stopped by law, if possible. The first claim is seldom true, for the worst of these sinners. It is those who compromise with their conscience and follow the bolder ones, who take the low prices. For instance, a neighbor with groves alongside of mine shipped his tangerines in early November and got, gross, $6.00 and $7.00 for them. I commenced November 20th, and they sold for $5.00 and even lower later in the season. I am no lawyer, but I don't believe that the law can touch the matter, except it be through Boards of Health at the northern end; nor would I advocate it if I could, for I believe there is and always will be legitimate demand for a small quantity of early green fruit at good prices, and just so long as this is the case, just so long as growers are hungry for money in the fall, just so long as the fear of loss through drought, cold or other disaster is upon him who has a crop for sale—just so long will there be a rush of green oranges to market early in the season, [fol. 179] a few condemned by health authority, a few high prices realized and then a slump and disappointment for the laggards. As these things will continue, why rant over them? Let the early shippers have their experiences. They cannot all be happy ones, and the more there are the sooner will every consumer get to know the true conditions, and the lover of sweet oranges will be taught to wait for them until Nature has had time to ripen their sugars and temper their raw acids.

Though oranges grow in size throughout the shipping season and very high prices are often realized in March and early April, the danger from cold to the fruit of unprotected groves, the great dropping that commences when growth starts in the tree, the tendency to crease, to get puffy, to dry out and lose flavor late in the season, make it questionable whether it is best to hold even a part of the mid-season varieties later than the first week in March. After this, the later varieties may be shipped

at good prices and fair profit from groves well south in the state or farther north if the groves are protected from injury from cold.

Load your own fruit into cars wherever possible, even though there be but a few boxes in the shipment, and see that the ventilators are all open.

As between express and freight, for sound fruit I prefer the latter, believing that the rougher handling and stealage by express more than compensate for the difference in time of delivery, to say nothing of the greater difficulty in collecting just claims.

The lesson then, that I would teach is carefulness that should run, like the red strand in the cordage of the English navy, through all our operations and relations with our fruit. This, coupled with honesty and loyalty to ourselves and the handlers of our products, will allow of our shipping our fruit to the north in ventilated cars and there hold more than our own against the pre-cooled and iced fruit of our worthy rival, California; but the lack of it during the past season has cost us dearly in both money and the reputation of our fruit.

[fol. 180] I also have some rules posted in my packing-house, and if you would care to hear them I will read them to you. They are for the guidance of help, and No. 18 is for casual visitors as well.

1

Care must be taken when picking oranges not to clipper-cut, bruise or thorn them.

2

Every picker must put his number on the boxes he picks.

3

Do not let oranges remain in the hot sun when waiting to be hauled, or for long when on the drying rack.

4

Every orange must be washed, and sponges used regularly when washing.

5

Keep plenty of water in the washer to hold weight of fruit so as to wash clean.

6

All oranges must be examined for long stems and all found must be closely clipped before the fruit goes into the washer.

7

When curing, oranges should not be over two layers deep.

8

Keep a constant and careful lookout for anything that will injure the fruit, such as nails, slivers, sharp edges or long finger nails. All persons handling fruit for shipment should keep their finger-nails closely cut.

9

Be careful to have cushions in place when pouring oranges into bins or hopper, and see that no injury is done to any that may be already there.

[fol. 181] 10

Look out for blue mold about bins or boxes and for rotten oranges in the packing-house. Thes should be removed at once.

11

Care in packing, washing, grading, packing and all work connected with preparing fruit for market is of greater importance than speed.

12

Every doubtful orange is a cull.

13

Citrus fruits should remain in this packing-house to cure at least thirty-six hours.

14

Pack true to grade, size and quality, and so that when the cover is put on the fruit will be tight in the box.

15

Each packer must put his initials or number on every box he packs; also grade and number of fruit in the box. Customers will be reqeusted to send us the packer's mark on every box badly packed, so that the packer can be held responsible.

16

The W. S. Hart brand must be known as an honest brand.

17

No excuse is a good one for carelessness or waste of time.

18

All persons, both casual visitors and help, must bear in mind that this is a place of business and not for loafing, long stories or gossip; nor must visitors divert the attention of the help from their work for long at any time.

No one but the undersigned has authority to change these rules.

W. S. Hart.

[fol. 182] He who knows it all and resents instruction, is hopelessly ignorant, a disappointment to himself and vexing to others, the last to be employed when help is scarce, the first to go when it becomes plenty.

[fol. 183] PLAINTIFF'S EXHIBIT No. 10

B. P. I 421. Issued December 16, 1908

United States Department of Agriculture, Bureau of Plant Industry

Circular No. 19

B. T. Galloway, Chief of Bureau

The Decay of Florida Oranges While in Transit and on the Market[a]

By Lloyd S. Tenny, Pomologist, Assisted by G. W. Hosford, Assistant Pomologist, and H. M. White, Scientific Assistant. Field Investigations in Pomology

Introduction

Since the season of 1906-7 an investigation of the causes of decay in oranges shipped from Florida has been carried on by the Bureau of Plant Industry. Since 1904 a similar investigation has been in progress in California, where it

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[a] This paper summarizes certain phases of the experimental investigations into the handling of Florida oranges that have been under way during the last two seasons. This work covers one feature of the general study of fruit marketing, transportation, and storage methods that has been in progress in our field investigations in pomology since the organization of this Bureau. While longer continuance of the Florida work is necessary before final conclusions can be formulated, certain results obtained are so significant and so consistent with the results of similar work in California which has been prosecuted for a much longer time that their economic importance is believed to justify immediate publication. While numerous details of grove, packing-house, and transportation treatment require further attention, the fundamental importance of the careful handling of the fruit during all the harvesting and marketing operations is emphasized by the results of these experiments.—B. T. Galloway, Physiologist and Pathologist, and Chief of Bureau.

has been found that the decay is caused principally by improper methods of handling the fruit in the groves and packing houses. The results of the California investigations have been published in Bulletin 123 of the Bureau of Plant Industry, entitled "The Decay of Oranges while in Transit from California," by G. Harold Powell, Pomologist in Charge of Fruit Transportation and Storage Investigations, and associates.

Extent of Loss from Decay in Florida Oranges

During a cool, dry period many Florida oranges reach the market in good condition, but when the weather is warm and moist, cars of fruit arrive showing sometimes as much as 30 per cent or more of decay. A conservative estimate of the total loss from decay in Florida oranges would be $500,000 annually. There is an even greater injury to the reputation of Florida oranges because of the large amount of decay that develops after the fruit reaches the hands of the wholesale dealer or the retailer. Probably nothing has more to do with the low price of Florida oranges at any time than the fact that the buyers can not depend on the fruit keeping sufficiently long to be retailed.

[fol. 184] Cause of Decay in Oranges

The common decay in oranges is cause by the growth of a minute form of plant life within the tissue of the fruit. The most common fungi causing orange decay are species of Penicillium. The fungi are spread by spores which do not seem to have the power of entering an orange having a normal uninjured skin. The first requisite for decay, therefore, is a bruised or broken skin. Whenever such an injury has occurred and the spores are present the fruit will decay if the moisture and temperature conditions are favorable for the development of the fungus. Like most other forms of plant life, these fungi grow best in a warm, moist atmosphere. If the weather is cold or very dry, even injured fruit on which the spores are present may not decay.

The experimental work has been planned with this understanding of the cause of decay in mind. The work was divided into three general lines, as follows: (1) A determination of the amount of injury in the fruit caused handling the oranges in the groves and packing houses,

long stems left by the pickers in severing the fruit from the branches being also counted, since the number of these determines to some extent the amount of injury produced in the subsequent handling of the fruit; (2) packing-house experiments in which fruit handled in different ways was packed and held in the house for two weeks, at the end of which time the percentage of decay in the different lots was determined; and (3) shipping experiments and market tests, in which the fruit handled under different conditions in the groves and packing houses was shipped by the regular transportation methods to Washington, D. C., and held there in a fruit-storage room, the decay being determined on arrival and at the end of each succeeding week.

Injuries and Long Stems

Punctures in the skin of the orange are the most common injury. These are made with the clippers when the fruit is severed from the branches. The amount of injury depends on the individual picker. Many pickers do not injure more than one or two oranges in a hundred; others cut as many as 25 per cent. During the season of 1906-7 only a limited number of oranges were examined, but of these 5.7 per cent had been cut with the clippers and 6.7 per cent had been injured by other means, as by the branches of the trees through which they had been pulled, by splinters from the field crates, by twigs or dirt in the bottom of the boxes, or by cuts made with the finger nails of the pickers or packers. About 7 per cent of the oranges had stems sufficiently long to injure other fruit.

During the season of 1907-8 the percentage of injured fruit was found to be even greater. The following table gives detailed information as to the amount of injury and the number of long stems in oranges picked by one gang of laborers: